AUTOMOTIVE INDUSTRIES

NOVEMBER 1, 1953

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

ENGINEERING • PRODUCTION • MANAGEMENT

In This Issue... Higher Power Chrysler V-8s · · · Tomorrow's Planes · · · New Air Brake System · · · Dodge V-8 Engines for Trucks · · · Canada's Booming Vehicle Industry · · · Conference on Automotive Hydraulics · · ·

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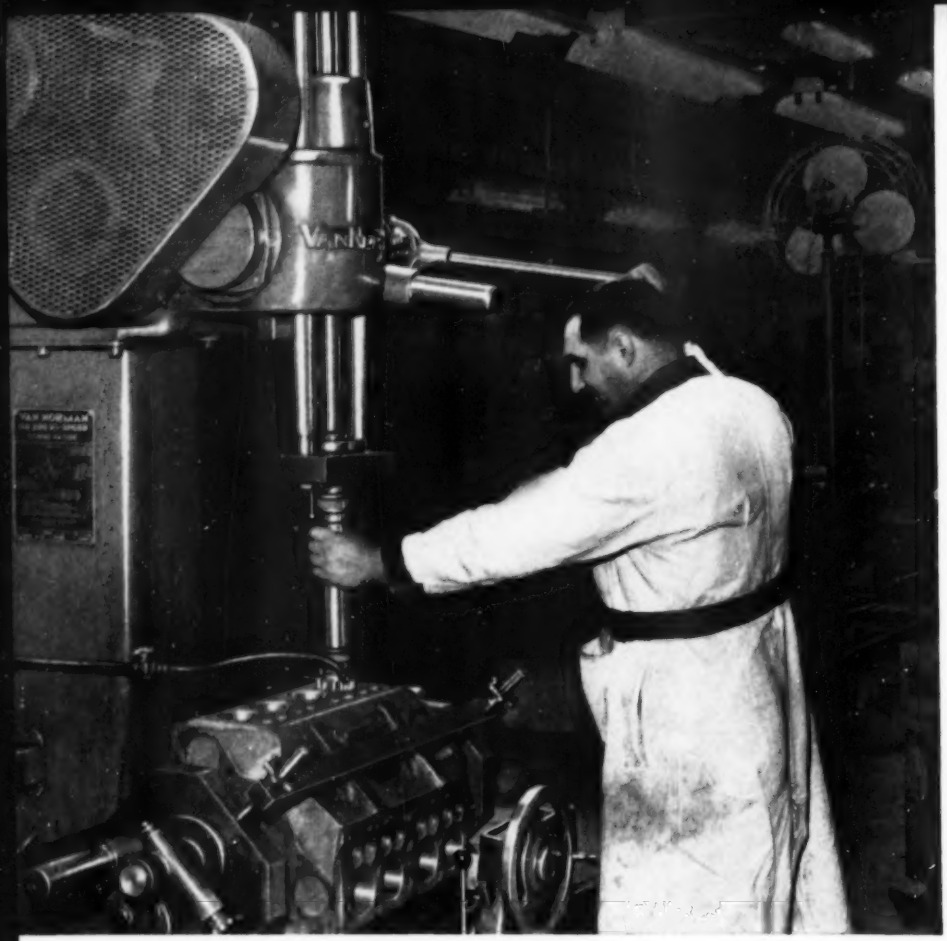


Better honing results from start to finish with...

STANICUT
TRADE MARK
Cutting Oil

A midwest metalworking company—rebuilder of a popular automobile engine—had a cutting oil problem. On the honing operation, shown above, the finish obtained on engine cylinders did not measure up to the high quality desired by that firm. Various honing oils were tried without measurable improvements.

The problem was put to a Standard Oil cutting oil specialist. He recommended the use of STANICUT Oil No. 62 FC, a light-colored, light-bodied cutting oil that contains the correct proportion of extreme-pressure and friction-reducing ingredients. From every angle, STANICUT has proved ideal for the job. The desired finish has been obtained on the cylinders. Tool life has been greatly increased. Oil consumption has been reduced.

Whatever your machining operation, the Standard Oil cutting oil specialist serving your area of the Midwest has the cutting oil that will meet your needs. He has the experience and special training necessary to help you get better cutting oil results. How you can get his help easily and quickly is explained at the right. Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR Problem?

J. E. Weston, of Standard Oil's Kansas City office, is the lubrication specialist who helped this metalworking company solve a "finish" problem on the honing operation described at the left.

Like all of the many Standard lubrication specialists located throughout the Midwest, he has the experience and special training necessary to analyze his customer's needs. Like all of Standard's lubrication specialists, he is close at hand and therefore able to give his customer on-the-spot assistance.

You can reach the lubrication specialist serving your area of the Midwest by phoning your local Standard Oil office. He will be glad to discuss your operations and with no obligation to you. There may be savings for you in the benefits offered by such outstanding cutting oils as:

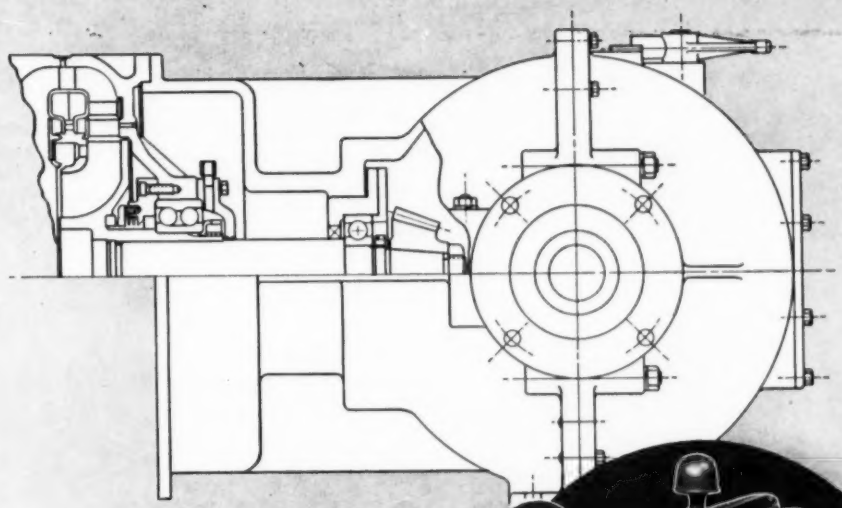
STANICOOL HD Soluble Oil — Because it contains additional compounding, this heavy-duty soluble oil possesses not only the cooling ability of an emulsion but also the ability to give better tool life and finer finishes than can be obtained with a conventional soluble oil.

STANOSTAMP Compounds — Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be removed readily in conventional washing equipment.

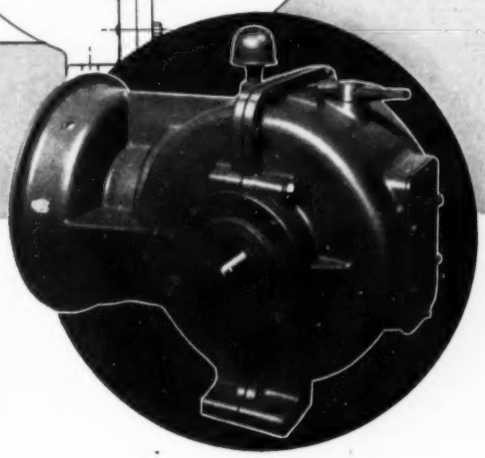
STANDARD OIL COMPANY

STANDARD *(Indiana)*

Now... get easier control of power through a wide range of torque conditions



Compact, heavy-duty Cotta Right-Angle Drive designed especially for power transmission on a switching locomotive.



with special Engineered-to-order

COTTA TRANSMISSIONS

Typical of Cotta's ability to develop special transmissions for specific needs is this forward and reverse transmission, right-angle drive. On a switching locomotive it provides a flow of power through a wide range of torque conditions. At the same time, it has all the ruggedness and lifetime stamina which characterize transmissions ***built by Cotta!*** Operators of railcars, winches, drilling rigs, trucks, hoists and other heavy-duty mobile units are enthusiastic about the easy operation and increased efficiency of these compact mechanical drives.

If you are considering torque convertors for your mobile equipment, and you need a special transmission with job-proved, heavy-duty features — input torque between 150 to 2000 foot pounds — come to Cotta!

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

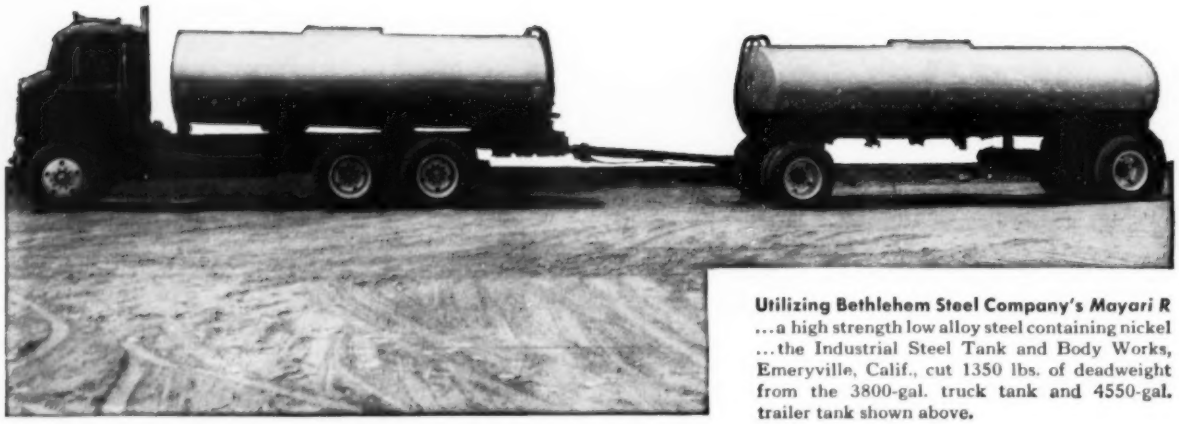
COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA

HEAVY-DUTY TRANSMISSIONS

"Engineered-to-order"



Utilizing Bethlehem Steel Company's *Mayari R* ...a high strength low alloy steel containing nickel ...the Industrial Steel Tank and Body Works, Emeryville, Calif., cut 1350 lbs. of deadweight from the 3800-gal. truck tank and 4550-gal. trailer tank shown above.

Cuts 1350 lbs. of Deadweight

from Truck and Trailer Tanks by using High Strength Low Alloy Steel containing Nickel

Contributing the same strength as thicker, heavier sections of plain carbon steel, light sections of high strength low alloy steel containing nickel allow substantial weight reductions in these vehicles...

Obviously, every pound trimmed off not only saves fuel, but reduces wear on tires and brakes. Thus, operating expenses go down. But more important... revenue goes up as a result of increased payloads.

Resistance to many types of corrosion, another valuable property of high strength low alloy steel sheets containing nickel, helps to lengthen the life of vehicle bodies.

These high strength steels containing nickel along with other alloying elements are produced under various trade names by leading steel companies. They provide three basic advantages:

1. High strength in the as-rolled condition, permitting important weight reductions or improved factors of safety.

2. Good resistance to corrosion, abrasion and impact.

3. Excellent response to usual fabricating operations, including forming and welding.

Consult us on the use of these high strength nickel alloy steels in your products or equipment. Write today.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

A CHILTON MAGAZINE

AI AUTOMOTIVE INDUSTRIES

PUBLISHED SEMI-MONTHLY

NOVEMBER 1, 1953 VOL. 109, NO. 9

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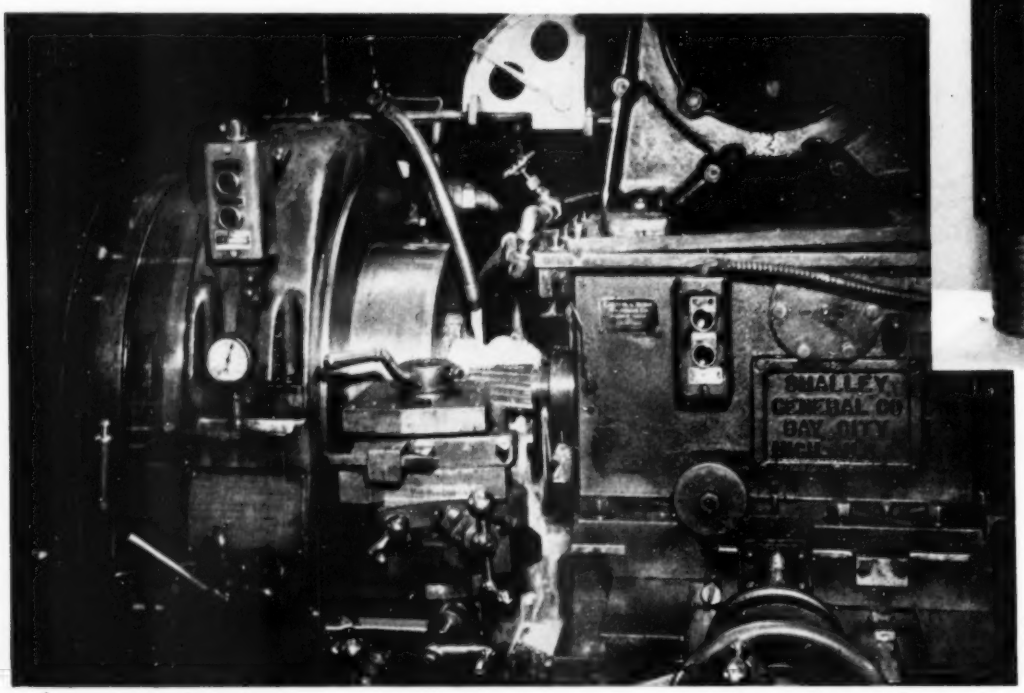
EXCELLENT FINISH AND *NO RUST!*

"Texaco Soluble Oil has saved us thousands of dollars."

— George C. Long, Superintendent
Hydril Company, Rochester, Pennsylvania



ONE of the important steps in making the Hydril Company's patented Twinpin Connectors is the milling of a step thread. The job is done on Smalley General Thread Millers, using a 1:20 emulsion of *Texaco Soluble Oil C.*

"We get excellent finish and tool performance," says Superintendent Long, "but we are most impressed by the rust-preventing ability of *Texaco Soluble Oil.* Our greatest problem was rusting. At one time, circumstances forced us to keep thousands of dollars' worth of finished parts exposed on open pallets for four and a half months in severe humidity. We can thank *Texaco Soluble Oil* for the fact that *we had no single case of rusting or indication of rust on the parts.*"

Let a Texaco Lubrication Engineer help you get similar results in your plant. There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to assure better, faster, lower-cost machining of every kind.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

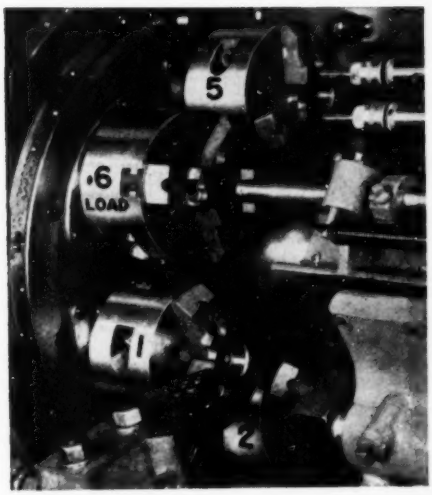
TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

ASK **BAIRD** ABOUT IT!

HIGH PRODUCTION TOOLING

A BAIRD CASE HISTORY



View of machine from front.

1
Finish turn flange O.D. (3.44"). Rough turn hub dia. Rough face flange and hub.

2
Chamfer I.D. Chamfer flange dia. and hub.

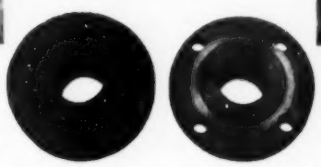
3
Finish turn hub, finish face flange and hub.

4
Drill and c'sink 4 holes — 23/64" dia. drill x 29/64" dia. C'sink, sub land drills. (Work held stationary when drilling.)

5
Tap 4 holes 7/16" — 14NC — 3. (Work positioned, held stationary, lead screw operated.)

6
Unload and load.

View of machine from rear.



The part . . .
before and after machining.

FINISHING A CAST IRON PULLEY HUB . . .

PRODUCTION

Cycle time 23.12 seconds per piece.
Gross production 155 pieces per hour.

Here's another example of the way a single Baird High Production Machine can be tooled to handle a series of operations ordinarily not considered practical on a single spindle automatic unit. Note that, in addition to the usual concentric operations being performed on this hub, we are drilling, countersinking, and tapping accurately located bolt holes in the hub flange at just two stations in the cycle and at a very satisfactory production rate for the whole operation. Photographs show the tooling and relative simplicity of the set-up.

And, as in the case of all Baird No. 76 Chucker installations, this one is conspicuous for smoothness and dependability of everyday performance. Automatic chucking frees operator's hands for efficient, easy feeding. Automatic safeguards prevent damage to work, machine, or injury to operator in case of incorrect loading. Spindle speeds are independently adjusted to best performance of the individual operation.

To step up speeds, quality of work, reduction in costs, check the Baird Chucker. "Ask Baird about it."

1BA53

the BAIRD MACHINE COMPANY
STRATFORD • CONNECTICUT

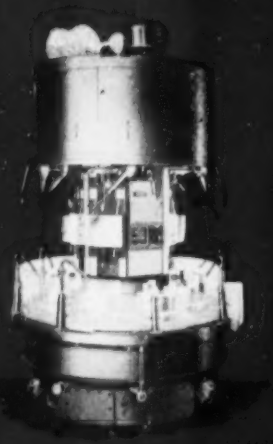
AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

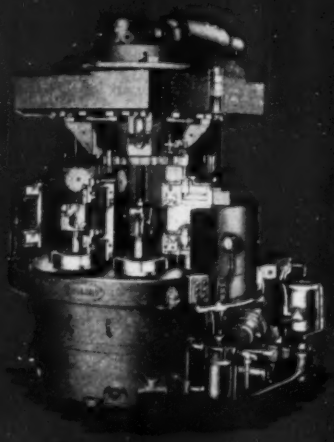
MORE PRODUCTION THROUGH

Modernization

with

BULLARD

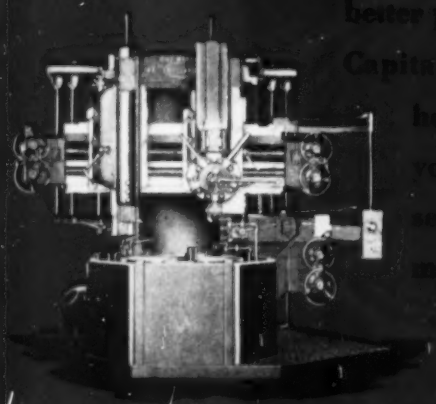


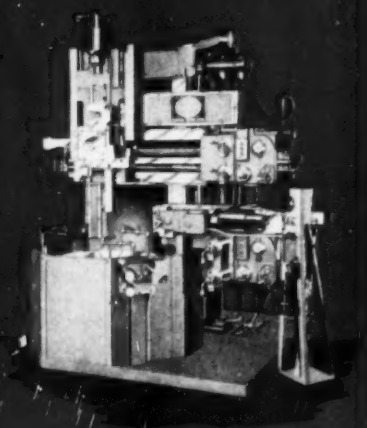


MACHINE TOOLS

Many complicated and diversified metal working operations are being efficiently performed on Bullard Machine Tools. They speed up production . . . reduce scrap to a minimum . . . produce better pieces at lower cost.

Capitalize on Bullard "know how" as others have—call in your nearest Bullard representative or write for information on the Bullard line.





The BULLARD COMPANY

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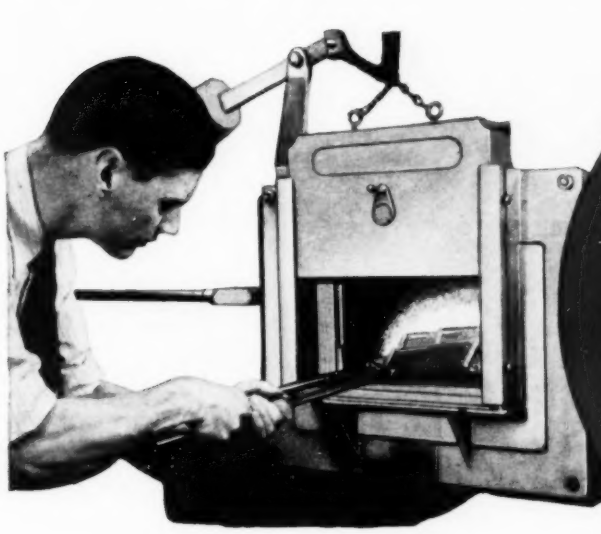
TROUBLE-FREE SPRING PERFORMANCE *with*

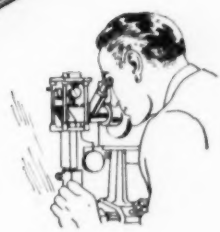


DSP

Leaf

SPRINGS

starts with careful laboratory analysis of steel.



Metallurgical inspection of both the chemistry and physical properties of all steel used in DSP Springs is a vital part of our production sequence.

This inspection insures a uniformity of quality in the steel, which is the basic element of Leaf Springs. It provides, through actual specimen check, essential information regarding heat treat and drawing temperatures necessary to insure maximum fatigue life in the finished product.

Continuing laboratory research guarantees, to the greatest possible extent, "trouble-free" spring performance—another reason why *the makers of most of America's trucks use DSP Leaf Springs as original equipment.*

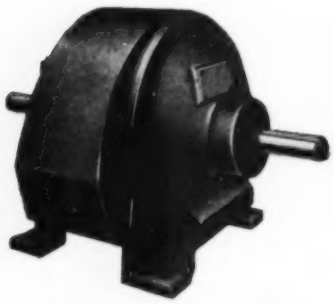
Automotive Division

DETROIT STEEL PRODUCTS COMPANY

Also Makers of *Fenestra* Building Products

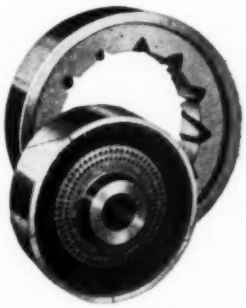
2250 E. Grand Blvd., Detroit 11, Michigan

SINCE 1904 — ORIGINAL EQUIPMENT ON CARS, TRUCKS, CABS, BUSES, TRAILERS

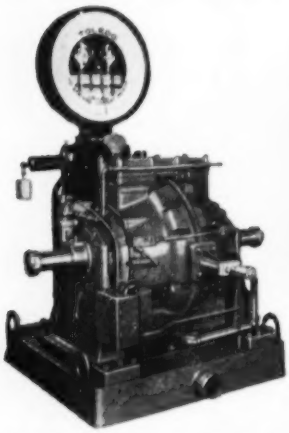


AIR COOLED COUPLINGS

AJUSTO-SPEDE MOTORS



AIR COOLED BRAKES



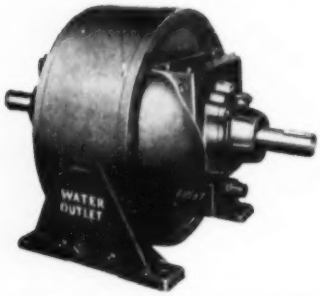
ABSORPTION DYNAMOMETERS

EATON

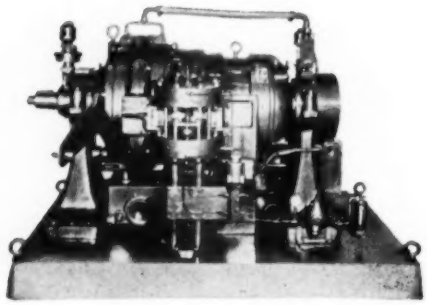
DYNAMATIC

EDDY-CURRENT ROTATING EQUIPMENT

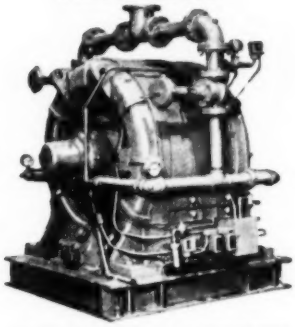
PRESS DRIVES



LIQUID COOLED COUPLINGS



UNIVERSAL DYNAMOMETERS



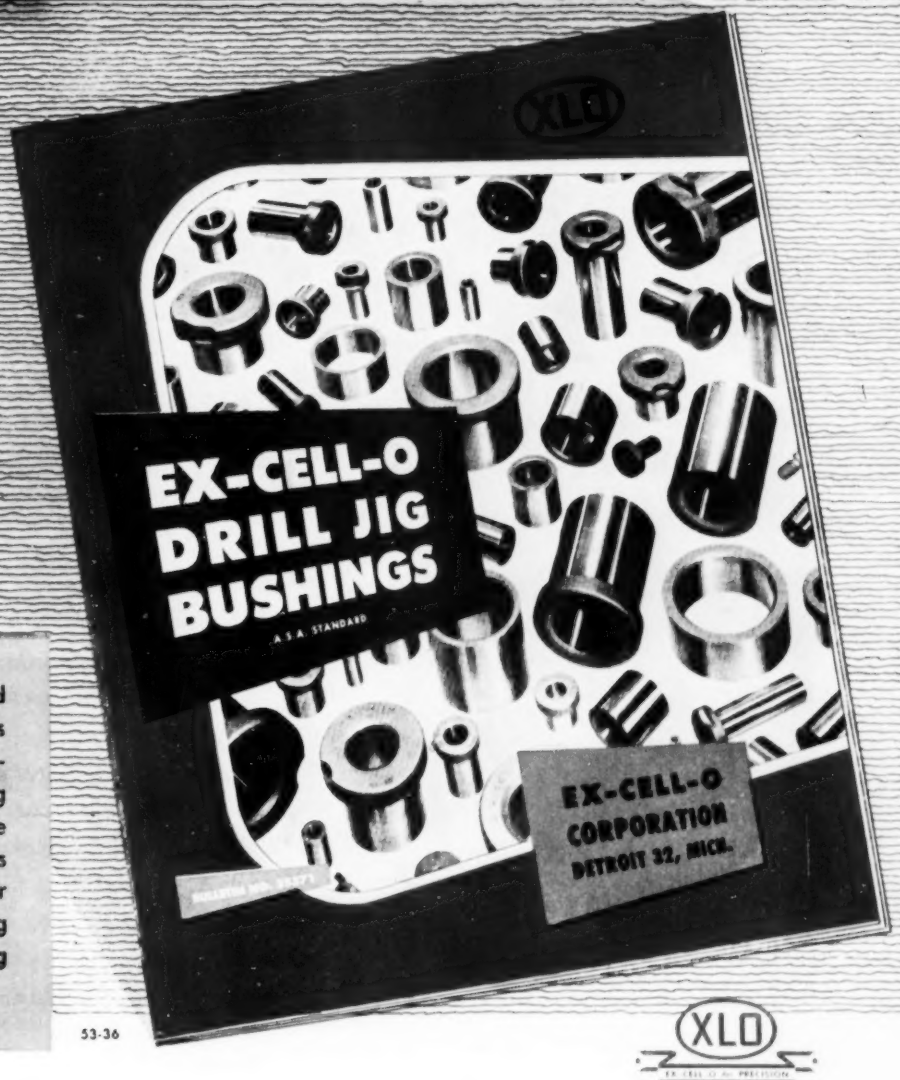
LIQUID COOLED BRAKES

Dynamatic Eddy-Current electro-magnetic equipment represents the ideal solution for a wide range of adjustable-speed drive problems, particularly where an AC power source is a requirement. Typical applications include paper machine drives, cement mill drives, industrial truck clutches, press drives, crane brakes, fan drives—in fact, practically all test, processing, and conveying equipment common to industry. Instantaneous response and accurate control are important advantages.

Write for your copy of Bulletin GB-1 which describes and illustrates the basic Dynamatic units.

DYNAMATIC CORPORATION KENOSHA • WISCONSIN

Subsidiary of EATON MANUFACTURING COMPANY, Cleveland, Ohio



Standard sizes and types of Bushings are listed in Ex-Cell-O Catalog No. 35371. Write for as many copies as you'll need for your purchasing and engineering departments.

53-36

XLO

ALWAYS IN STOCK:

EX-CELL-O Drill Jig Bushings

QUALITY: Typical of Ex-Cell-O's precision products are its A.S.A. standard Drill Jig Bushings. Made of premium grade tool steel—Hardened to 62-64 Rockwell "C"—Precision-ground inside and out, and under the head for perfect bearing on the bushing plate.

DELIVERY: Ex-Cell-O has Drill Jig Bushings in stock for IMMEDIATE shipment from Detroit, New York, Los Angeles and Toronto. See address at right of nearest source.

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DETROIT 32, MICHIGAN

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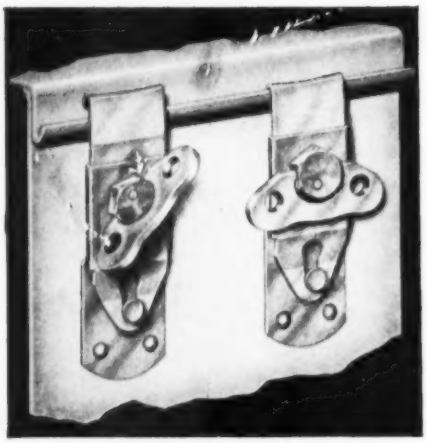
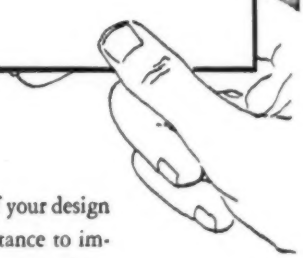
MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Have you a similar fastening problem?

File: Simmons LINK-LOCK



When the armed forces needed a positive, high-strength fastening device for instrument housings, transit cases, and storage boxes, Simmons developed LINK-LOCK. This *brand-new* device doesn't use springs, yet works with fingertip pressure through a unique mechanical arrangement: the vertical sliding latch is moved in and out of locking position by a disc rotated with a wing nut. The fastener is immune to low temperatures, is easy to operate even with arctic mittens, furnishes up to 450-lb. pull-down pressure. Open or closed, it lies flat against the side of the case it fastens.



LINK-LOCK may be the answer to your fastening problem. If your design involves heavy fastening pressures, watertight sealing, high strength, resistance to impact, ask about LINK-LOCK. Simmons can furnish it with special engagement-latch details, or for operation by bolt or screwhead instead of wing nut. Write for LINK-LOCK DATA SHEET today. It gives complete details and dimensions. A Simmons engineer will be glad to work with you on your fastening problems.

SIMMONS FASTENER CORPORATION, 1749 No. Broadway, Albany 1, New York

Simmons QUICK-LOCK SPRING-LOCK ROTO-LOCK LINK-LOCK DUAL-LOCK

JUST OUT! NEW 36-PAGE CATALOG WITH APPLICATIONS. SEND FOR IT!

Standard Grades of Alloy Steel Will Often Do the Job

In many instances you can meet alloy steel requirements with standard grades. Applications, civilian or military, that really require the temperamental special grades are relatively few.

In the "special" bracket are the jobs where resistance to heat, corrosion, or low-temperature impact is the prime consideration. Here, generally speaking, you have to call upon other than standard grades. Bethlehem is usually able to supply them.

But wherever feasible, it is to your advantage to specify standard analyses—mainly for these reasons:

1. Standard grades meet the usual requirements for hardness, strength, and ductility.

2. With standard grades, chemical ranges usually fall within closer limits than those of special grades; hence you can use the conventional, more familiar—and often less costly—methods of heat-treating.

3. You can normally buy standard-grade steels in small tonnages, keeping your inventory low. In contrast, the user who orders an other than standard grade must in most instances specify a heat lot.

Bethlehem manufactures all AISI grades and special-analysis steels, and the full range of carbon steels. Please remember that we can always furnish the grade you wish, whether standard or special. But if there's any question of choice, anything not quite clear concerning grades and their applications, by all means discuss the problem with our metallurgists. They are always at your service.

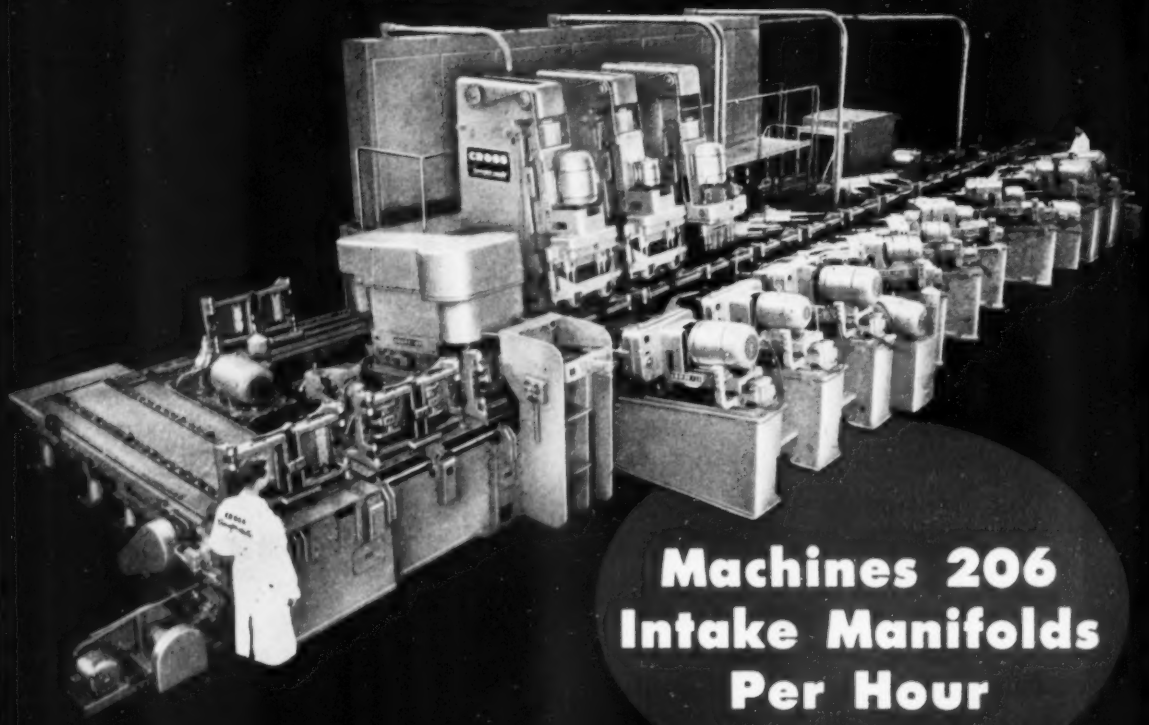
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM ALLOY STEELS

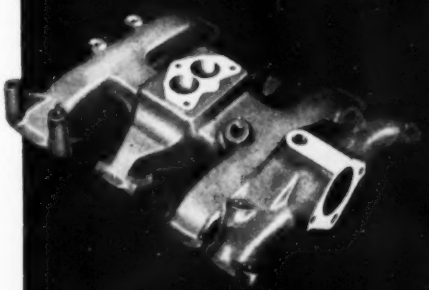
BETHLEHEM STEEL

Another Transfer-matic by Cross



Machines 206 Intake Manifolds Per Hour

- ★ Two parts machined at one time in each station.
- ★ 100 operations—two milling, 48 drilling, four boring, 20 chamfering, four spotfacing, and 22 tapping.
- ★ 14 stations—one loading, one unloading, 12 working.
- ★ Palletized work holding fixtures with power wrenches for automatic clamping.
- ★ Integral conveyor for automatic return of palletized fixtures from unloading to loading station.
- ★ Other features — automatic chip removal; hardened and ground ways; automatic lubrication system; J. I. C. standard construction.



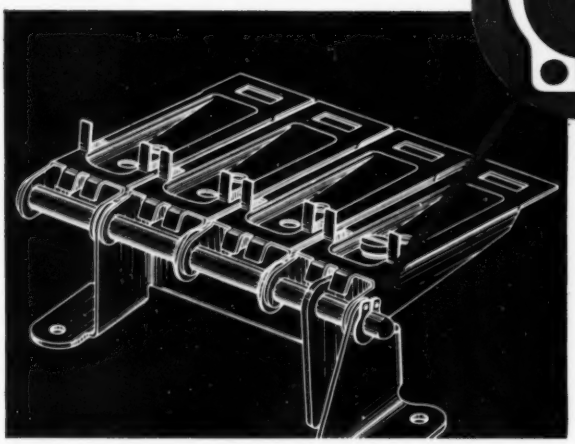
Established 1898

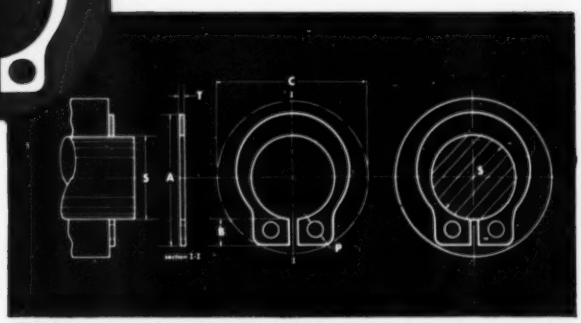
THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

New Waldes Truarc GRIP Ring requires no groove, holds fast by friction, can be used over and over again





Ring # 5555		5555-12	5555-13½	5555-18	5555-25	5555-31	5555-37
SHAFT DIAMETER	Fract. Equiv. S	1/8"	—	3/16"	1/4"	5/16"	3/8"
	Dec. Equiv. S	.125	.136	.187	.250	.312	.375
	TOL.	±.002	±.002	±.002	±.002	±.003	±.003
RING DIMENSIONS	Thickness T	.025	.025	.035	.035	.042	.042
	TOL.	±.0015	±.0015	±.002	±.002	±.002	±.002
	Length A	.268	.285	.364	.437	.553	.626
	Lug B	.078	.078	.097	.097	.141	.141
	Hole P	.042	.042	.042	.042	.078	.078
	Min. Ring Clear C	.33	.34	.44	.50	.67	.73
Approx. Ultim. Thrust Load (Lbs)		20	20	25	35	50	60

The Waldes Truarc Grip Ring is a new, low cost fastener that provides a positioning shoulder secure against moderate thrusts or vibration. Installed on a straight ungrooved shaft, the Truarc Grip Ring can be assembled and disassembled in either direction with Truarc pliers.

The Grip Ring can be installed tightly against a machine part in order to take up end-play. The basic Truarc design principle assuring complete circularity around periphery of the shaft and the ring's unusually large radial width combine to exert considerable frictional hold against axial displacement. The ring can be used again and again.

Find out what Waldes Truarc Retaining Rings can do for you. Send us your drawings. Waldes Truarc engineers will give your problems individual attention without obligation.

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WALDES

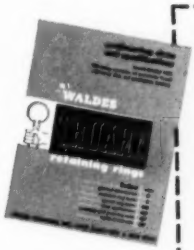
TRUARC

REG. U. S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U. S. PATENTS: 2,382,947; 2,382,948; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,380; 2,483,383; 2,487,602; 2,487,803; 2,491,306; 2,509,081 AND OTHER PATENTS PENDING



Waldes Kohinoor, Inc.,
47-16 Austel Place, L.I.C. 1, N. Y. AY-115

☐ Please send me sample Grip-Rings (please specify shaft size _____)

☐ Please send me the complete Waldes Truarc catalog.

(PLEASE PRINT)

Name _____

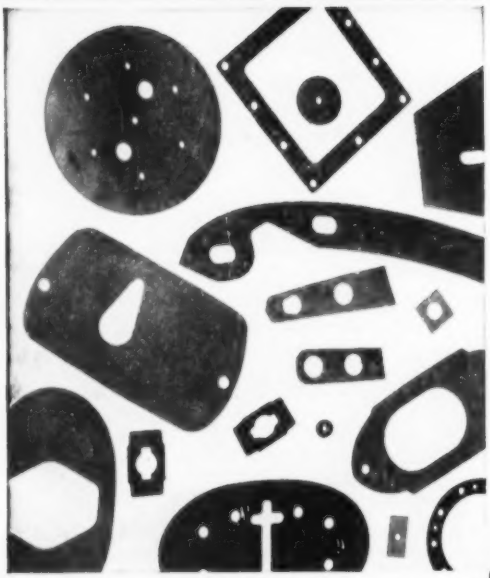
Title _____

Company _____

Business Address _____

City _____ Zone ____ State _____

Unsurpassed *Synthetic* RUBBER COMPONENT PARTS



Users of Acadia Synthetic Rubber component parts in hundreds of industries have found them unsurpassed. No matter what function synthetic rubber must perform, depend on Acadia parts. They best meet exacting specifications and operating conditions such as moisture, oil, heat, wear and age resistance. Molded, extruded, die-cut to close limits—compounded to meet specific conditions. Acadia engineers will gladly cooperate.

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- Gaskets
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- Cups
- Channel
- Strip
- "O" Rings
- Sheet
- Tubing
- Roll Goods
- Cut Parts
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Sheet and Roll Felt Manufactured for Special Purposes and To Meet All S.A.E. and Military Specifications.

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Delpark *Central Filtration*

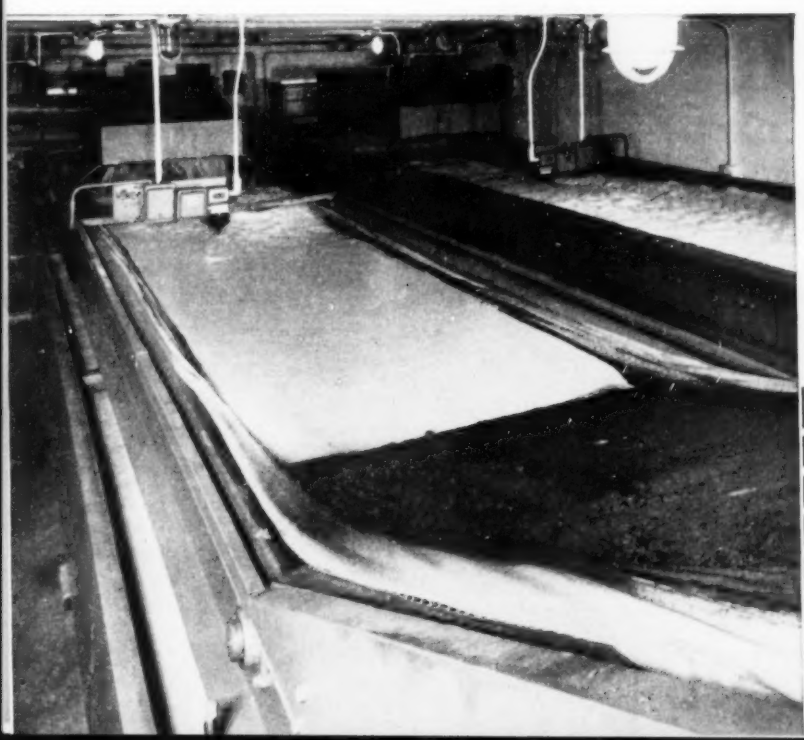
CLEARS THE WAY FOR GREATER SAVINGS AT WARNER & SWASEY

New Philadelphia, Ohio

With plant modernization in mind . . . or new plants in design—if coolant systems are part of the plan, complete the picture with DELPARK *Central Filtration.*

It's here that tremendous savings can be made. For instance, at Warner & Swasey's New Philadelphia Plant, coolant supplied to 24 machines had been in use for seven months without changing—as of the middle of July. The labor savings on coolant changing over this period alone makes interesting figures —but the coolant savings in a 4200 gallon system makes even better figures. The result is: No contamination of coolants. Fewer rejects due to off sizes or attrition. Machines retain their original accuracy longer.

This will mean more to you if the performance is in your plant. Write today for more information on DELPARK *Central Filtration.* DELPARK engineers are ready to assist you with designs for economical and efficient operation.



Two DELPARK *Automatic Filters at below-floor-level station handle coolant flow of 450 gallons per minute each. One maintenance man services these filters on a part-time schedule*

Delpark

INDUSTRIAL FILTRATION

Backed by more than 30 years experience in Industrial Filtration

INDUSTRIAL FILTRATION COMPANY
19 Industrial Avenue, Lebanon, Indiana

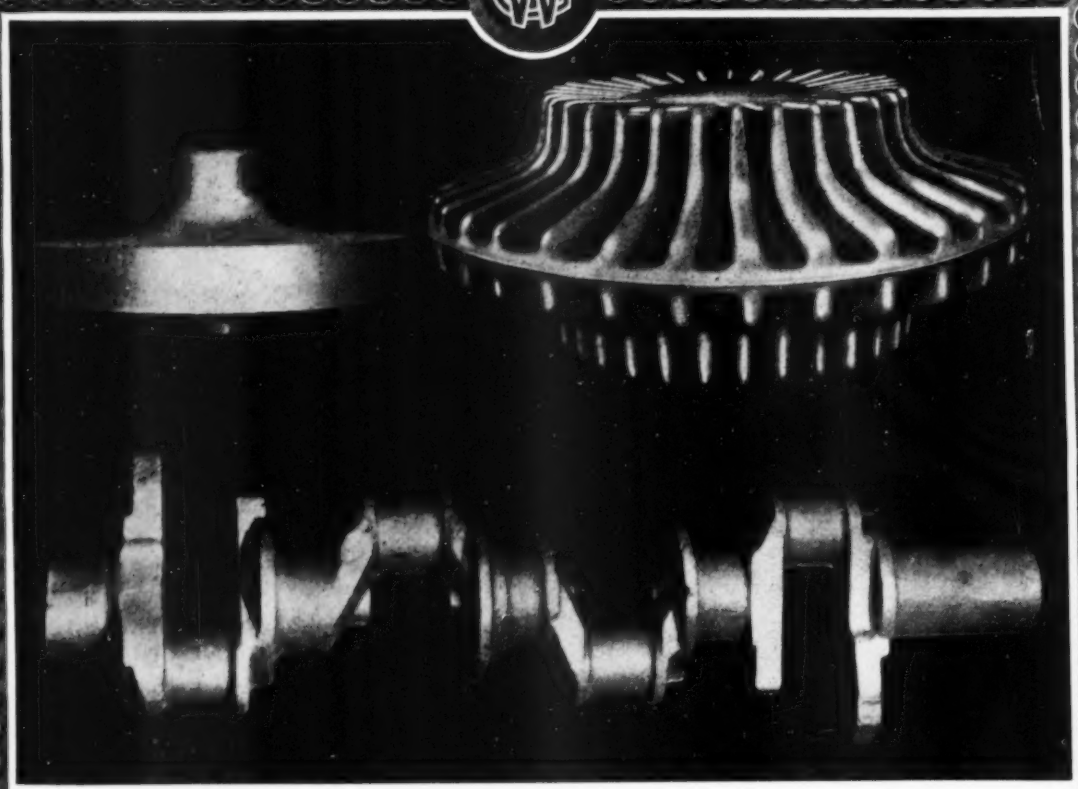
Gentlemen: We would like more information on DELPARK *Central Filtration.*

Name.....*Title*.....

Company Name.....

Street Address.....

City.....*State*.....



Wyman-Gordon — specialists in the vital forgings of the internal combustion engine since its inception—is today the largest producer of crankshafts for the automotive industry and of all types of forgings for the aircraft industry. Be it crankshafts and other vital forgings for the piston type engines or turbine wheels and impellers for turbo jets—there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty-Five Years

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FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

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Now! get faster, easier starts...

FOR ANY GAS OR DIESEL ENGINE

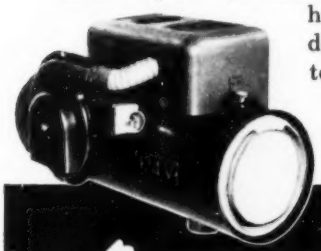
even at 65° below!

WITH South Wind PRE-HEATING SYSTEMS

One heater provides *all 3!*... Engine starting, cab heating —defrosting!

Another Revolutionary South Wind First! With South Wind Pre-Heating Systems you get the same quick, reliable engine starting for any gas or diesel engine that major aircraft and military vehicles enjoy! First choice of engineers and maintenance men, they're designed to make starting easier at all temperatures—*even 65° below!*

Never Before such compactness, such power, such adaptability! *Heater* provides engine preheating, cab heating and defrosting! Economical, too! South Wind Pre-Heating Systems reduce battery drain by reducing starting torque—cut the cost of starting aids. Eliminate the shock loads imposed by brute-force starting methods. Lower maintenance costs—prolong engine life!



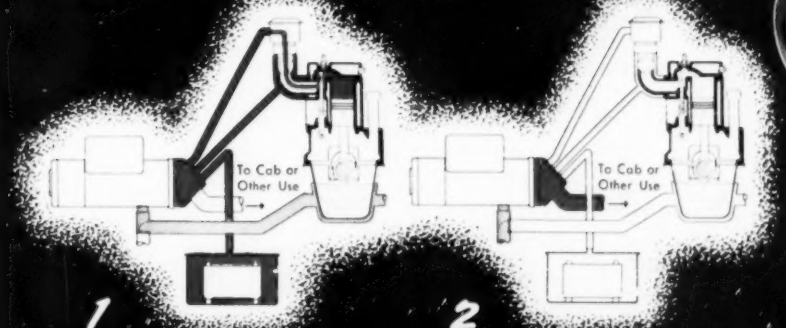
Model 978 MF
20,000 BTU/hr.
fresh air output
Total output, 30,000 BTU/hr.

Clean, Dry Air is delivered to engines by South Wind Heaters! They permit use of optimum viscosity lubricants and assure normal lubrication at all times. Remove moisture—inhibit sludge formation and freeze-up of engine accessories, too.

A Model for Every Requirement! South Wind Heaters meet every *internal* or *external* preheating need. They include units of 20,000, 30,000, 50,000, 60,000, 100,000, 200,000, 600,000, and 700,000 BTU/hr. capacities.

An experienced staff of South Wind Field Engineers is ready to consult with you on any preheating problem. Write today to South Wind Division, Stewart-Warner Corp., Indianapolis 7, Ind.

2-PHASE EXTERNAL PRE-HEATING

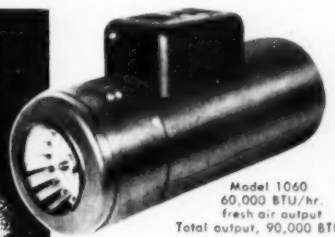


1

Pre-Heat Phase. Clean, dry hot air is applied to the exterior surface of the carburetor and intake manifold, and to the battery, by the use of shrouds. The oil sump is heated in like fashion by hot gases from the heater exhaust. (Clean, hot air which enters the air intake is, in some cases, provided for the starting phase.)

2

Operational Phase. After starting engine, clean, hot air from the heater is diverted to cab for personnel heating, defrosting and other uses. (If the application demands, part of this air can be used to provide continuous heat for battery and/or air induction system.) Heater exhaust is diverted directly to atmosphere.



Model 1060
60,000 BTU/hr.
fresh air output
Total output, 90,000 BTU/hr.

Model 1030
30,000 BTU/hr.
fresh air output
Total output,
50,000 BTU/hr.

A PRODUCT OF SW STEWART WARNER

South Wind

PERSONNEL HEATING
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

Stop Vibrator Power Supply Troubles Before They Start

The best time to do this is while your equipment is still on the drawing board. Each element . . . the vibrator, transformer and buffer capacitor . . . must be carefully selected for balanced electrical characteristics if your power supply unit is going to do the right job when it gets in service.

The best way to avoid vibrator power supply trouble is to call on the specialized knowledge and experience of Mallory engineers. Let us analyze the power requirements of your equipment and help you translate them into a power circuit that will give the performance you need.

Why call on Mallory? There are a lot of reasons . . . good ones. In the first place our experience in this field is backed by an unmatched fund of engineering knowledge that started over 20 years ago . . . when we produced the first commercial vibrator. Our experience includes supplying more vibrators for original equipment than all other makes combined.

That's not all. We are equipped to design and manufacture complete power supply units . . . to your exact requirements . . . to meet your production schedules. If you want to save engineering time and reduce production costs, write us today. It is a good way to stop your troubles before they begin.

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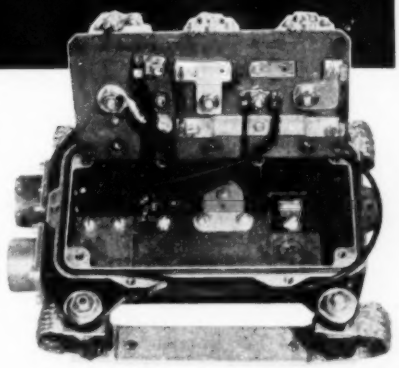
Martin B-61 Matador pilotless bomber taking off. Made by the Glenn L. Martin Company, Baltimore, Md.

Jeep almost completely submerged. Can be operated in this position at about 9 miles per hour. Made by Willys-Overland Motors, Inc., Toledo, Ohio, for the Armed Forces.



Generator regulator for the 24-volt system of the submersible Jeep. This is completely waterproof and highly resistant to corrosion and fungi. Produced by The Electric Auto-Lite Company, Toledo, Ohio.

Illustrated are two of the many types of capacitors and filters made by Aerovox Corporation, New Bedford, Mass.; an important capacitor supplier to both Electric Auto-Lite and Glenn L. Martin. The unit above is the filter capacitor used in the generator regulator of the submersible jeep while the unit at the right is used in the pilotless bomber.

In the Air— On Land— Under Water—

WHERE REQUIREMENTS ARE SEVERE, CALL REVERE

The dramatic pictures on this page show two important special applications of Aerovox capacitors. One is the Martin B-61 Matador pilotless bomber. It contains an Aerovox capacitor, which has to withstand the terrific acceleration and speed of the craft. The other is the submersible Jeep. Its 24-volt electrical system is completely waterproofed, and includes Aerovox filters and capacitors for suppression of radio interference. Revere not only supplied copper and brass strip for the capacitor cases, but collaborated closely in setting up specifications, and in addition worked on a welding problem. In regard to the latter, an Aerovox Project Engineer wrote: "We have had much better welds." . . . Revere is always glad to collaborate on problems concerning copper and its alloys, aluminum alloys, and electric welded steel tube. Call the nearest Revere Sales Office.

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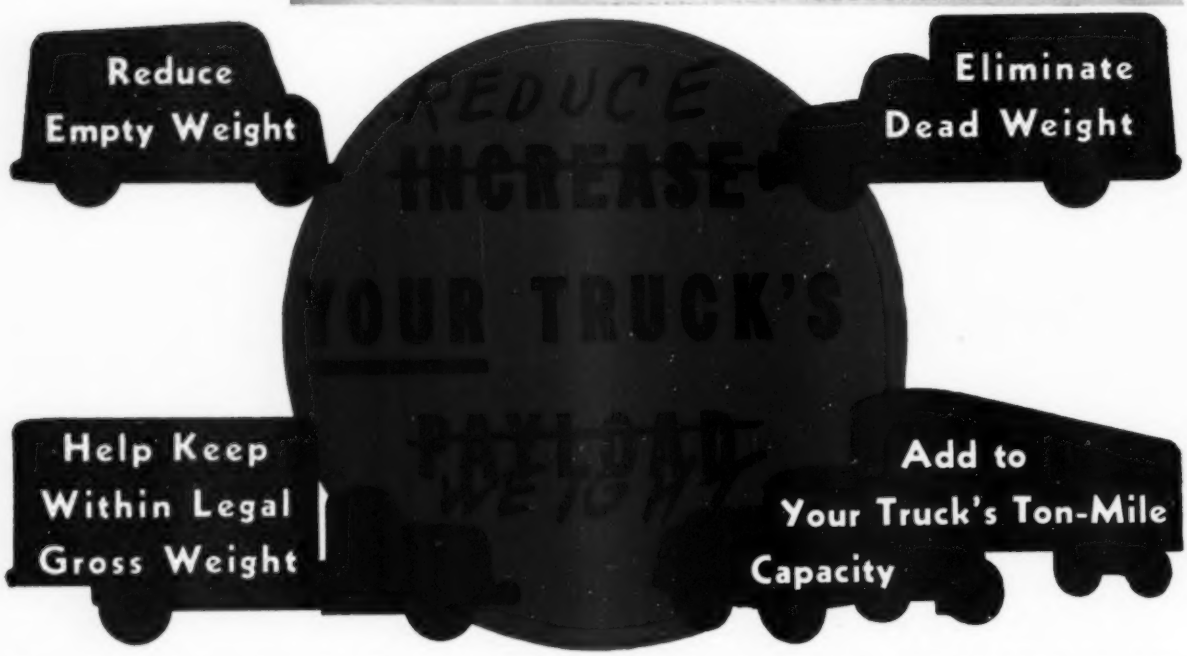
FLASH .... FLEET OPERATORS ARE PAYING A PREMIUM

OF ONE DOLLAR PER POUND FOR REDUCED TRUCK WEIGHT



A truck manufacturer says big fleet operators are offering $1.00 per pound for reduced truck weight — and that the use of lighter metals has reduced weights down to their lowest achievement point — within acceptable standards of life and wear. Because MECHANICS Roller Bearing UNIVERSAL JOINTS truck PROPELLER SHAFT is pounds lighter than other joints and shafts of comparable torque capacity — you can reduce the weight of *your* truck by specifying MECHANICS. Let MECHANICS engineers help reduce the weight and increase the payload capacity of *your* truck — and give it a competitive weight advantage — with a MECHANICS Roller Bearing UNIVERSAL JOINTS truck PROPELLER SHAFT application.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois

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QUALITY control that begins in the laboratory eliminates reject troubles and saves costly production interruptions for users of Permite Aluminum Castings.

A first step in Permite quality control is spectrographic analysis to determine that the metal fully meets alloying specifications. X-ray examination of castings on a mass production basis assures castings free of hidden flaws.

Surface imperfections, invisible to the naked eye, are detected by the use of modern Zyglo black-light inspection. Checks made on the Optical Comparator, Angle Computer, and other advanced instruments at different stages of production insure dimensional accuracy.

Yes, Permite Castings, with quality proven before shipment, will save costly slow-downs, keep your production lines humming. Send blueprints or specifications on your castings requirements for recommendations and estimate.

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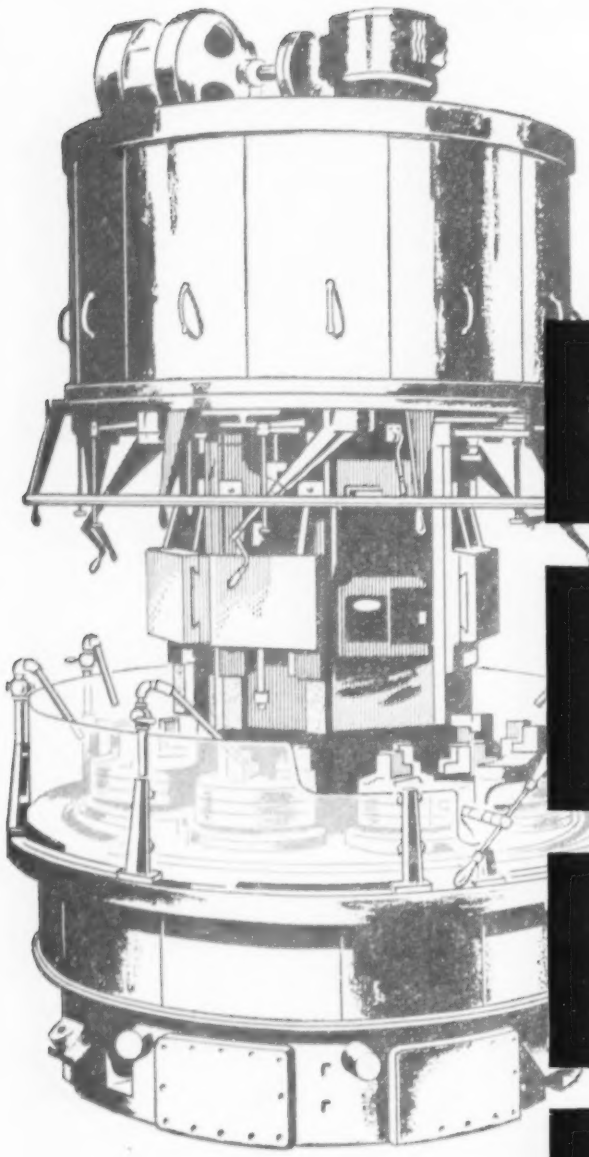
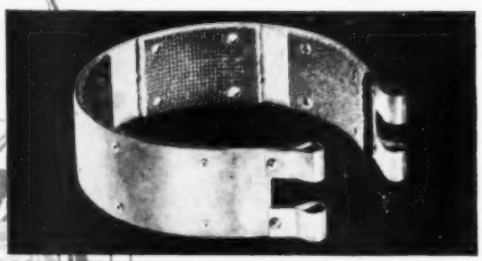
DETROIT: 809 New Center Bldg. - NEW YORK: 9 Rockefeller Plaza - CHICAGO: 64 E. Jackson Blvd.

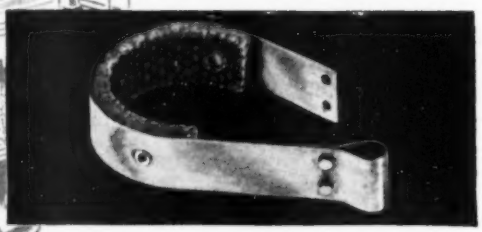
PERMITE Aluminum Castings

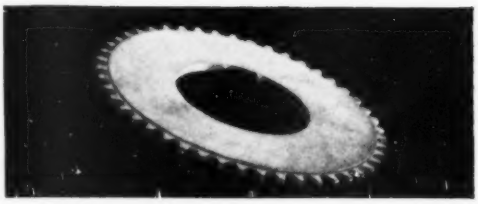
ALUMINUM PERMANENT MOLD and SAND CASTINGS . . . HARDENED, GROUND and FORGED STEEL PARTS

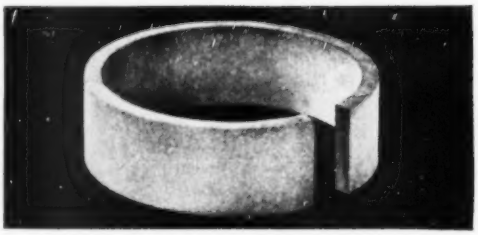
R/M
FIRST IN FRICTION









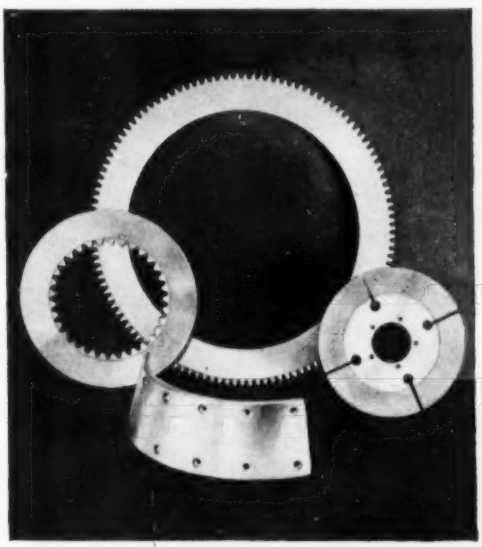


This multi-spindle vertical chucking lathe requires three entirely different types of friction materials for three completely different applications. R/M supplies all three, in five part numbers, saving the manufacturer the trouble of having to go to several sources to satisfy his requirements.

THE TRADE-MARK THAT SPELLS PROGRESS IN FRICTION MATERIAL DEVELOPMENT!

The story at the left typifies that of the many manufacturers who have chosen to make Raybestos-Manhattan their single source of supply for friction materials. R/M offers the distinct advantage of an exceptionally wide range of top quality products. Outstanding results are achieved because R/M works with countless combinations of different types of friction materials . . . including woven and molded asbestos, semi-metallic materials, and sintered metal parts.

If you are making or designing a product which requires friction materials, talk to your R/M representative. You will find he can work from samples, from designs on paper, from figures on horsepower developed combined with the desired performance characteristics. Behind him stand all the facilities of the world's largest maker of friction materials.



There's an increasing need for sintered metal parts. This is particularly true where applications call for close tolerances or operating conditions require immersion in oil. R/M is producing these parts as fast as industry needs them.

Write for your copy of the R/M Engineering Bulletin. It describes and illustrates many R/M friction materials for aviation, agriculture, the automotive industry and others.

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Detroit 2 Cleveland 14 Los Angeles 58

Factories: **Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C. Crawfordsville, Ind. Neenah, Wis. Canadian Raybestos Co. Ltd., Peterborough, Ont.**

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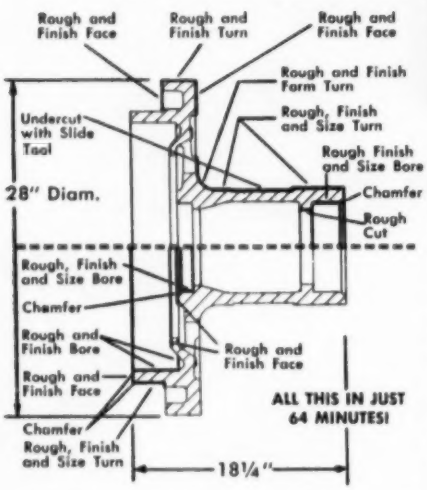
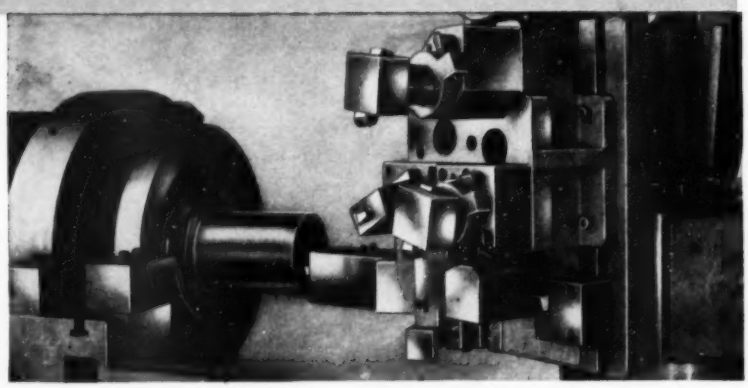
YOU'LL DO IT FASTER...BETTER

Automatically on a POTTER & JOHNSTON MODEL 10-U

CLUTCH HOUSING
Meehanite "C" Casting



HEAVY LINES INDICATE MACHINED SURFACES



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FOR COMPLETE INFORMATION . . . see for yourself how the Potter & Johnston Model 10-U Automatic is designed, engineered and built throughout to help you increase output, improve accuracy and finish, reduce rejects and cut production costs on your big, hard-to-machine jobs. Simply write direct to Pawtucket or contact the Pratt & Whitney Branch Office nearest you; ask for your free copy of 10-U Bulletin No. 146. Specifications and full engineering data are included.

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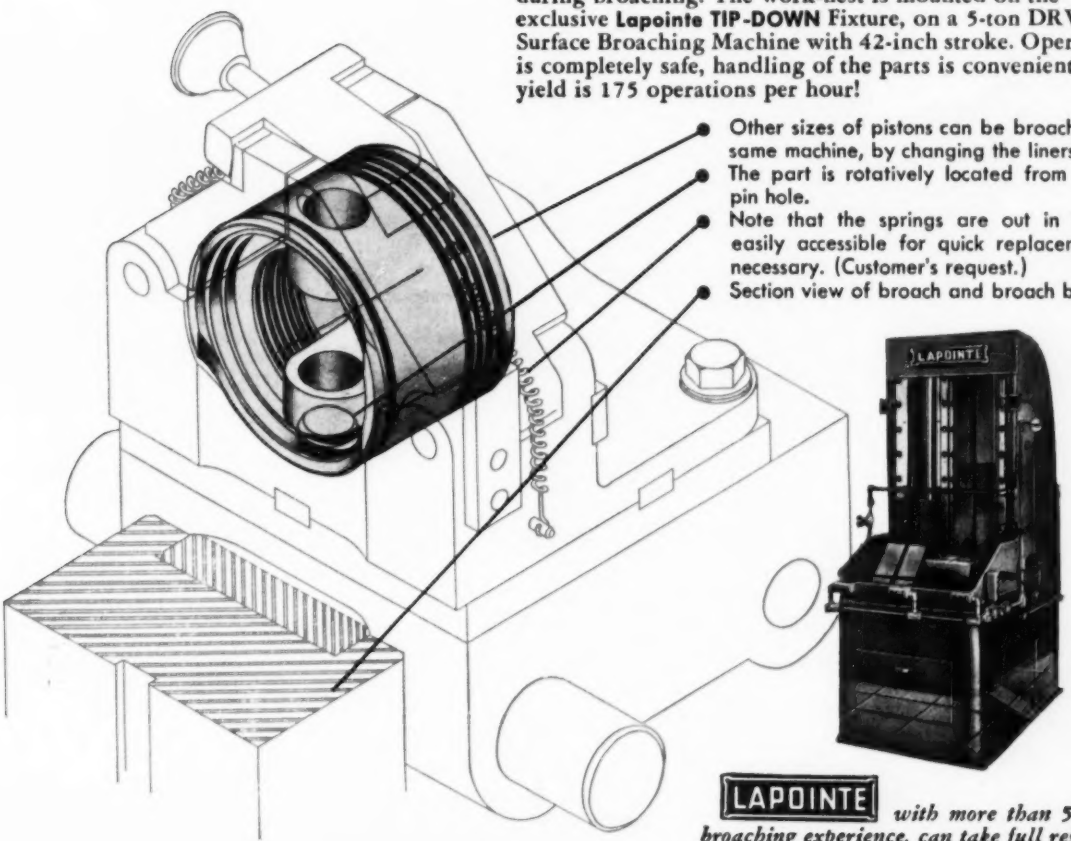
LAPOINTE SURFACE BROACHING

. . . the most economical method of metal removal for high production!

This piston is a good example of what can be done by **LAPOINTE** surface broaching. A "contour cut" is broached crosswise, across the end . . . with the piston firmly held in a fixture of unique Lapointe design.

We call it a shroud. Our engineers developed this quick-acting fixture to encompass the part and prevent distortion during broaching. The work-nest is mounted on the exclusive **Lapointe TIP-DOWN** Fixture, on a 5-ton DRV Surface Broaching Machine with 42-inch stroke. Operation is completely safe, handling of the parts is convenient, yield is 175 operations per hour!


Other sizes of pistons can be broached on the same machine, by changing the liners.
The part is rotatively located from the wrist-pin hole.
Note that the springs are out in the open, easily accessible for quick replacement when necessary. (Customer's request.)
Section view of broach and broach body.
LAPOINTE

LAPOINTE *with more than 50 years of broaching experience, can take full responsibility for designing and building the machines, tools and fixtures to suit your requirements. For information,*

write for Bulletin **DRV-10**

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

Aeroquip

REG. TRADE MARK

"little gem" FITTINGS

aeroquip did it again!
Another Important Development
in Detachable, Reusable
Hose Fittings!
KNIFE-LIKE SPUR separates hose inner tube and reinforcing wire braid during assembly.
CLAMPING ACTION, between nipple and socket, is exerted on reinforcing wire braid only.
POSITIVE LIP SEAL is formed by end of inner tube in annular chamber.

Here's another great Aeroquip first . . . *"little gem"* Fittings with radically new features never before seen in the industry! These amazing new fittings were especially designed to prolong the life of certain types of hose made of rubber or rubber-like materials, and plastics. Under extreme compression these materials tend to take a definite set and flow away from the zone of compression. This action is accelerated by heat. Through advanced research, development, and engineering, Aeroquip was able to provide the answer to this problem. *"little gem"* Fittings are now in production for Anti-Icing Hose Lines used on aircraft jet engines, and Steam Hose Lines in the industrial field.

"little gem" is an Aeroquip Trade Mark

AEROQUIP CORPORATION, JACKSON, MICHIGAN

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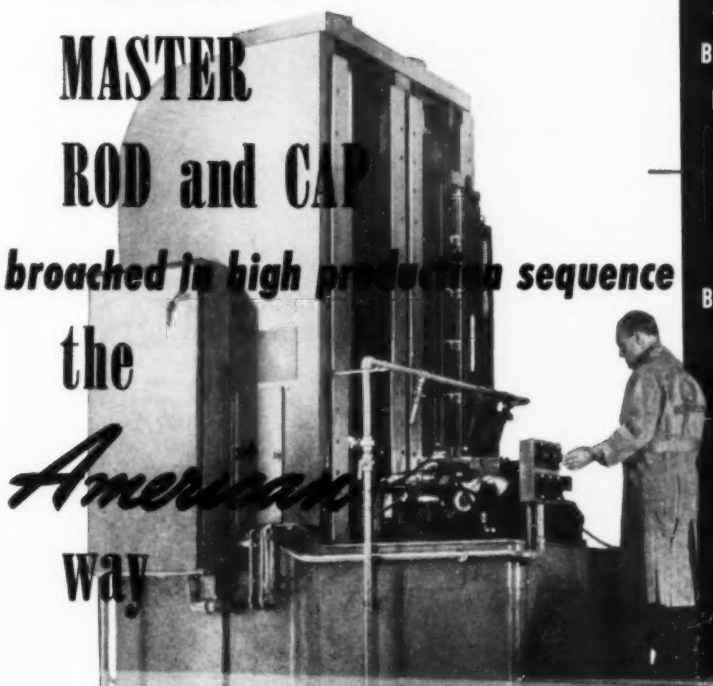
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

AIRCRAFT MASTER ROD and CAP

broached in high production sequence the American way

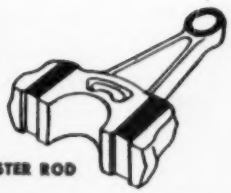


To simplify a metal removing problem on master rods and caps for aircraft reciprocating engines, six American dual ram broaching machines are used in high production sequence. These broaching machines rough and finish broach the surfaces, as illustrated.

This time and cost saving sequence is typical of the production methods possible with American machines. Send us a part print and your production requirements. American engineers will recommend the right machine and tooling, whenever broaching is the answer to your needs. *For additional data on the American SBD-72-30 write for circular No. 300.*

Address Dept. I

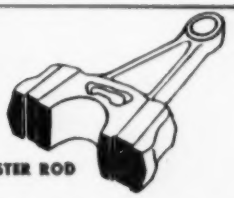
SBD-66-25 BROACHING MACHINE



MASTER ROD

Broach sides of main bearing and piston pin boss.

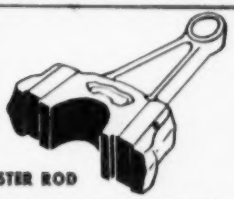
SBD-72-30 BROACHING MACHINE



MASTER ROD

Semi-finish cap seat surface and inside chamfers at bottom of seat.

SBD-72-30 BROACHING MACHINE



MASTER ROD

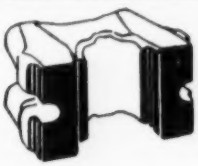
Rough and semi-finish broach main bearing bore and finish broach chamfers and relief grooves.

SBD-66-25 BROACHING MACHINE

CAP

Straddle broach sides and broach bolt head seats.

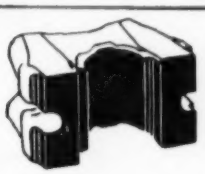
SBD-66-25 BROACHING MACHINE



CAP

Rough broach cap tongues and chamfers.

SBD-72-30 BROACHING MACHINE



CAP

Semi-finish broach main bearing bore and finish cap tongue and chamfers.

AMERICAN **American** BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

American Building - Ann Arbor, Michigan

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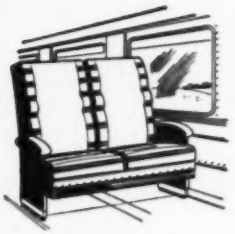
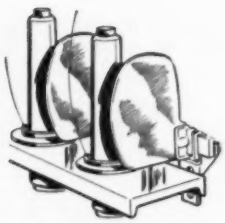
Our Fiftieth Year

A START FOR THE FUTURE

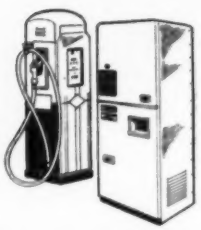
UNBRAKO BUTTON HEAD SOCKET SCREWS feature the following: threads to head; low head height; nonslip internal wrenching; hex socket that minimizes possibility of marred or mutilated heads; fully formed threads—Class 3 fit; heat treated alloy steel; standard sizes from #8 through ⅝" diameter.



USE UNBRAKO BUTTON HEAD SCREWS on transportation equipment—door and window frames, paneling, seats.



On textile machinery—slashers, twisters, bobbin shields.



On sheet metal assemblies—beverage coolers, gasoline pumps.

Have you checked our UNBRAKO standards?

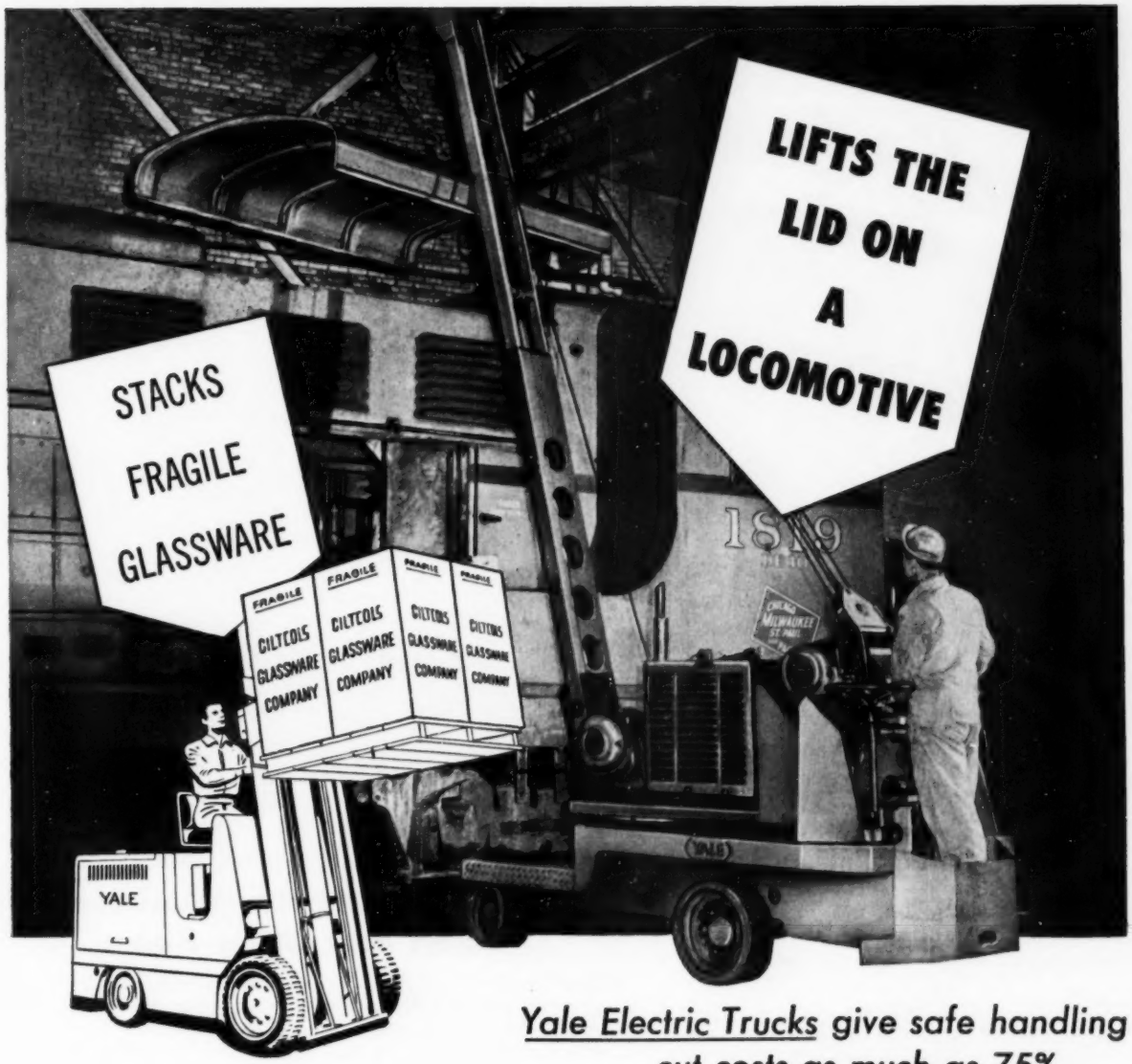
We suggest you do, because a standard UNBRAKO delivered from your distributor's stock means faster and better service. A standard will do the job as well as a special at much lower cost. For details about UNBRAKO Standards, write STANDARD PRESSED STEEL Co., Jenkintown 53, Pa.

Write for UNBRAKO Standards

UNBRAKO® SOCKET SCREW DIVISION

sps

JENKINTOWN PENNSYLVANIA



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DIFFERENT LOADS call for different equipment—and the comprehensive YALE line offers exactly the truck your job requires, whatever your business may be.

To keep down maintenance costs and assure 24-hour service, YALE Trucks offer such special features as: Hypoid Gears, Involute Spline Drive Shafts, and Yale Lift Channels. As a result, YALE users report unusual savings—with handling costs often reduced as much as 75%.

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Bendix Low Pedal Power Brake

one of the most popular new car features in years

Specified by More Car Manufacturers Than Any Other Make

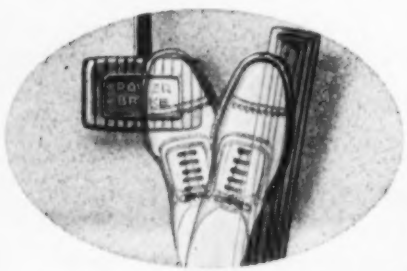
Since the earliest days of the industry, car manufacturers have entered each model year with a host of new improvements that represent added value for the motoring public.

While all of these advancements have contributed to greater motoring enjoyment, the "new car features" that have basically altered previous motor car standards of performance are relatively few in number. For example, four-wheel brakes, a Bendix development, brought new safety to the highways; automatic transmissions materially increased driving ease; and today another great new feature, Bendix* Low Pedal Power Brake, is recognized as a revolutionary advancement in motor car control.

It is the only low pedal power brake that has met the test of millions of miles. In fact, Bendix Low Pedal Power Brake is specified by more manufacturers than any other make. It is the product of Bendix—world's largest producer of power brakes and leader in braking developments since the earliest days of the industry.

To make your line more popular it pays to equip with the performance proven Bendix Low Pedal Power Brake. *REG. U.S. PAT. OFF.

NOW *Stopping* IS AS EASY AS *accelerating*



It is no longer necessary to lift the foot and exert leg power pressure to bring your car to a stop. With the Bendix Low Pedal Power Brake on about the same level as the accelerator, an easy ankle movement, much like working the accelerator, is all the physical effort required for braking. And by merely pivoting the foot on the heel, shifts from "go" to "stop" controls are made in far less time.

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Bendix Products Division

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High Spots of This Issue

★ SAE National Aeronautic Meeting

Tomorrow's airplanes constituted the focal point of discussion at the recent SAE Aeronautic Meeting in Los Angeles. The costs and complexities of these future aircraft were analyzed in a series of talks by experts, whose key remarks are reviewed here. Page 50.

★ Automotive Applications at Hydraulic Conference

The spotlight at the recent Ninth Annual Conference on Industrial Hydraulics was clearly on the automotive industries. A wide range of subjects from tractors to machine tools were covered in the sessions and papers, some of which are presented here. Page 54.

★ Canada's Booming Motor Vehicle Industry

Right in the forefront of those businesses participating in the tremendous growth of our Neighbor to the North is the motor vehicle industry. In less than 50 years it has grown from nothingness to gigantic proportions, as will be seen in this survey. Page 60.

★ Communist Vehicles at the Leipzig Fair

With a few exceptions, automotive enthusiasts who ventured into Eastern Germany's Lepizig Fair would have been disappointed if they were looking for anything startlingly new. It was possible, however, to obtain more data about standard production vehicles. Page 66.

★ Production Techniques for Corvette Plastic Bodies

In spite of the widespread opinion just a short time ago that plastic car body construction would not lend itself to mass production, Chevrolet plans to turn out 12,000 such cars next year. The author describes how this feat will be done. Page 70.

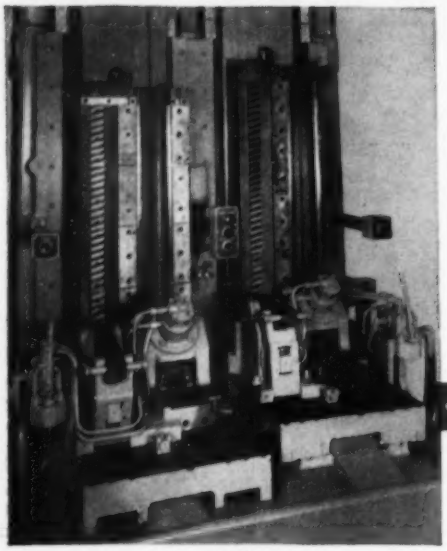
★ 28 New Product Items And Other High Spots, Such As:

Chrysler V-8 engines have 235 and 195 hp for 1954; special machine locates and drills rivet holes; new air brake system for lightweight vehicles; Dodge offers two V-8 engines on new line of trucks; and why alternator systems?

Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

Production Equipped by Cincinnati Milling for Lowest Cost

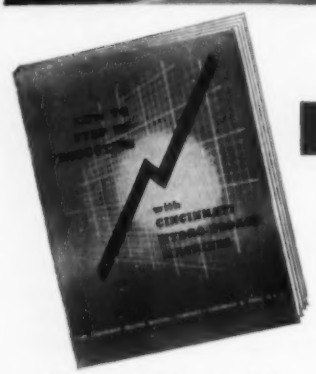


Three types of setups, engineered by Cincinnati on CINCINNATI Duplex Vertical Hydro-Broach Machines, all achieve a common objective . . . low-cost production of connecting rod caps. Many examples of other types of setups will be found in our folder, "How to Step Up Production with Cincinnati Hydro-Broach Machines," M-1599-1. It's yours for the asking. And if you would like to have complete information on CINCINNATI Single Ram and Duplex Vertical Hydro-Broach Machines, ask for catalogs M-1745 and M-1709-1. Brief data in Sweet's Catalog File for Mechanical Industries.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

TWO OPERATIONS ON TWO PARTS EACH MACHINE CYCLE

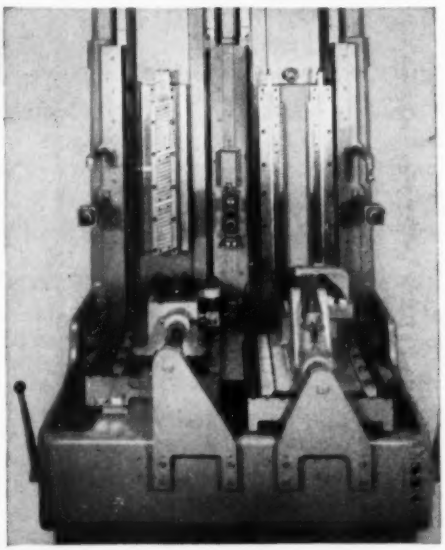
Part Name	Main bearing cap block
Material	Cast iron
Operation	Broach top of rear cap in left-hand station of each fixture, and oil grooves and transfer slots in right-hand station of each fixture
Stock Removal	1/8"
Production	210 per hour, complete
Equipment	CINCINNATI No. 10-66 Vertical Duplex Hydro-Broach Machine with complete tooling

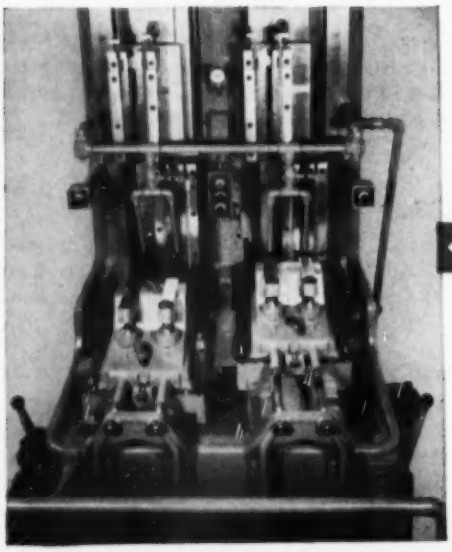


Write for this informative folder, publication No. M-1599-1.

PROGRESSIVE BROACHING

Part Name	Main bearing cap block
Material	Cast iron
Operation	Broach pad in left-hand fixture Broach two angular grooves in right-hand fixture
Stock Removal	1/8"
Production	150 per hour, complete
Equipment	CINCINNATI No. 10-54 Duplex Vertical Hydro-Broach Machine with complete tooling





FOUR PARTS EACH MACHINE CYCLE

Part Name	Connecting rod cap
Material	Cast iron
Operation	Broach sides (two parts in each fixture)
Stock Removal	3/32"
Production	615 per hour
Equipment	CINCINNATI No. 5-42 Duplex Vertical Hydro-Broach Machine with complete tooling

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 109, No. 9 **November 1, 1953**

Ainsworth Offers New Power Steering Unit

Another automotive supplier is entering the power steering field. Ainsworth Manufacturing Corp., which has been a major supplier of automotive parts since 1915, has announced an integral type power steering unit considerably different in design from any now in use. It will be offered for cars, trucks, buses, and tractors.

Basically, the unit consists of a constant volume pump delivering 1½ gpm, regardless of engine speed, and a fluid motor placed directly above the Pitman arm for direct action steering. The unit is of the full power steering type but does not interfere with the conventional steering feel, according to Ainsworth.

Due to its compact and simplified design, total installed weight is said to be approximately 40 lb. The unit reportedly can be removed or replaced in only 20 minutes without disturbing the passenger compartment or any electrical or transmission components.

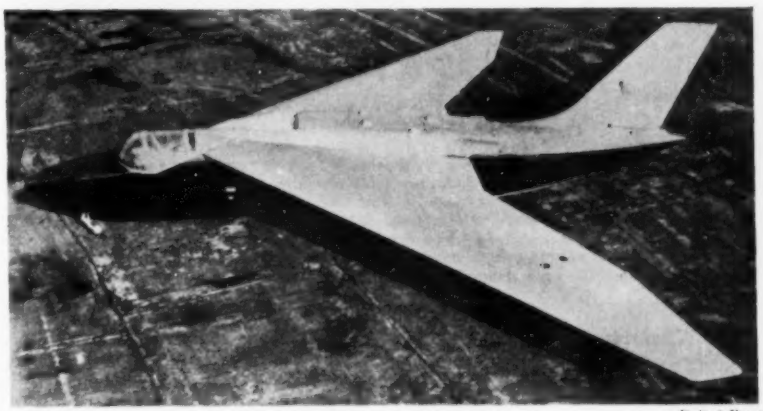
Two-Year Lease for Willow Run

Latest information indicates that the first function of the General Motors Livonia, Mich., Hydra-Matic plant, when it is rebuilt, will be as a supplier to Willow Run. GM is understood to have a two-year lease on its portion of the huge Kaiser plant. At press time, unconfirmed reports were circulating that GM was negotiating to buy the plant.

The foregoing would indicate that General Motors does not expect to resume assembly of Hydra-Matics at Livonia until sometime in 1955. Ample time for tooling for a reported new automatic transmission would thus be provided.

Meanwhile, excellent progress is being made at Willow Run where, by the middle of October, 2000 new or repaired machines had been received and 1000 of them installed; about 250 are ready for production. It still looks as though initial production will be started at Willow Run sometime in November with volume output attained by the end of the year.

An indication of how other GM divisions have cooperated are the four separate assignments given Chevrolet. In addition to setting up production as an emergency supplier of 89 parts and assemblies for Hydra-Matic transmissions, the division is also rebuilding machines damaged in the fire, is supplying some of its own tools to other plants for parts production, and is handling emergency traffic.



United Press

WINGED ADVENTURER

Described as a forerunner of higher-speed, high-altitude aircraft, the new short Sherpa was built and test-flown recently in Belfast, Ireland. The research plane has rotating wing tips in place of ailerons and elevators and two Turbomeca jet engines.

GE to Build Test Lab for Turbines

General Electric Co. will build a $1.8 million combustion laboratory for gas turbine research at Schenectady, N. Y. Construction will start early next year on the new unit.

Hudson Adopts B-W Automatic Drive

Hudson has announced officially that it is adopting the Borg-Warner automatic transmission on its 1954 models. The transmission is the same one used on Studebaker and consists of torque converter, planetary gear set, and direct drive clutch. The company did not indicate, however, whether or not it will stay with the B-W unit permanently or will go back to Hydra-Matic at some future date.

Supersonic F-100 Makes Its Debut

The Air Force recently gave its first public demonstration of the North American F-100 Super Sabre jet interceptor. The thin wings of the new fighter are swept back at a 45-deg angle. It is powered by a P&W J-57 jet engine with afterburner. Said to be easily able to exceed the speed of sound in level flight, the plane has a ceiling of over ten miles.

News of the AUTOMOTIVE

BRITISH SHOW ATTRACTIONS

Among the new British cars shown at this year's International Motor Show, held at Earls Court, London, recently, were the Bristol 404 sports coupe and the 403 saloon. The 404 is powered by a 100-B engine which develops 105 bhp at 5000 rpm. The Lockheed hydraulic brakes have separate front and rear fluid circuits and incorporate light alloy drums. Also made by the Bristol Aeroplane Co., Ltd., the 403 Saloon incorporates an engine (the 100-A) which develops 100 bhp at 5000 rpm. New features include a central remote control gear lever giving rapid change with minimum effort, and an air-conditioning system which permits recirculation of warm air when needed.

Nash-Hudson Talks Spur Merger Trend

Whether or not anything concrete develops from current discussions between Nash and Hudson over the possibility of either a merger or some type of cooperative operation, there is bound to be more activity among the independents along the lines of consolidation as the automobile industry heads into its most competitive year since before World War II.

Neither Nash nor Hudson have confirmed reports of merger discussions, but neither has there been any denial. There is enough evidence to make it fairly certain that talks are in progress.

If there is any outright purchase under consideration, it would probably be by Nash, since it is the larger company with more resources.

However, George Mason, Nash president, has dropped a hint that a deal possibly might develop whereby the two companies would integrate certain functions. Presumably, this would mean such activities as common body dies and cooperative purchasing of interchangeable components to take advantage of volume prices.

Certainly if there were any integration, either on the basis of a corporate merger or cooperative functions, a great many problems would have to be solved. It is no simple matter to integrate two companies directly competitive in the same field, both with long established dealer bodies and with products in practically the same price class all through the line.

There is no denying the fact that all the independents are facing a difficult year in 1954. Already they are feeling the effects of competitive pressure generated by their larger competitors. The industry is reportedly looking for a drop of approximately 10 per cent in sales next year. With a demonstrated production capacity far exceeding the sales potential, competitive pressure is going to be extremely heavy.

There is a growing conviction in the industry that economic compulsion will drive the independents into combinations of one kind or another as a necessity for survival over the long pull. Even though this may not take the form of outright purchase or corporate integration, the necessity of achieving, at least to some degree, the lower costs inherent in the large scale operations of their big competitors is a very real one.

Rubber Price Boost Proposal Blasted

Latest rubber industry official to score attempts by natural rubber producers to induce RFC to increase synthetic rubber prices by three cents a pound is W. O'Neil, president of General Tire and Rubber Co. He said such a price rise would constitute "gouging" of the American public and should not be given any consideration because the Government is already making a 15 to 16 per cent return on its rubber business.

Mr. O'Neil revealed that the Government had a profit of $60 million on its synthetic rubber operation during the 1953 fiscal year and that earnings for the current fiscal year will total $75 million. He added that an RFC official estimates synthetic rubber could be produced at a profit for under 17 cents a pound with petroleum base butadiene, considerably below the current price of 23 cents.

Natural rubber growers have been attempting to get the price of synthetic raised to 26 cents to bolster the natural price level. Currently, it is selling from two to three cents a pound under American synthetic.

NOT FOUR BUT THREE

The British "Regal" four-seater, made by Reliant Engineering Co., Ltd., approaches standard vehicle design with only three wheels. Two-door convertible body is fitted on box-section pressed steel chassis. Wheelbase is 74 in., and overall length is 123 in. Maximum speed is stated to be 65 mph, and fuel consumption is close to 60 mpg.

AND AVIATION INDUSTRIES

Hoffman Hints Industry Overproducing Cars

For the first time in the postwar period an automobile manufacturing executive has sided with dealers in the contention that the industry may be building too many automobiles. That premise has been advanced by a sizable segment of the dealer body for some time, since the market has turned extremely competitive.

Now, Paul G. Hoffman, Studebaker board chairman, has told automobile dealers in Toronto that production should be limited to the number of cars that can be sold at a profit by dealers with hard intelligent selling. He added that car manufacturers should ship no cars without a specific dealer order and also should not bring pressure on dealers to move cars at little or no profit to help maintain product position in the field.

With the exception of Hudson, which heartily endorsed them, officials of other companies made no direct comment on Mr. Hoffman's statements. However, James Cope, Chrysler vice-president, who by coincidence was speaking in Detroit on the same day, indirectly answered the Hoffman statements.

Mr. Cope pointed out that the so-called "saturation point" has been predicted many times since 1908. He went on to say that it still would be forecast when the industry is producing eight million cars a year in the future.

In assaying the potential automobile market, he commented that: 17 million families still do not own a car; of all car-owning families, 89 per cent have only one car; there is no car or truck on 29 per cent of U. S. farms; almost 30 per cent of the people between 30 and 40 years of age still do not drive; and one quarter of the cars and 1/5 of the trucks in use today are prewar models 12 or more years old.

MOBILE FARM EQUIPMENT LABORATORY

Engineers of the Ford Tractor Div., Ford Motor Co., have developed a motorized stress and strain laboratory, complete with sensitive electronic recording devices and high speed motion picture cameras. Equipped with four-speed trammission and all-wheel drive, the new "Travelab" can be used anywhere to field-test farm equipment.

Chrysler Corp. Purchases Briggs for $35 Million

On Oct. 23, Chrysler announced that it had purchased Briggs Manufacturing Co. for $35 million. Briggs makes a major proportion of Chrysler bodies.

Transfer of the properties is expected within 60 days after approval of Briggs stockholders and other interested parties has been obtained.

The agreement includes all main Briggs plants, machinery, and equipment, but not the Beauty Wear Div. of Briggs. It makes plumbing fixtures.

Douglas Skyray Sets World Speed Record

A Douglas-Navy F4D Skyray jet interceptor has returned the world's aircraft speed record to the U. S. Lt. Comdr. James B. Verdin recently piloted the plane over the shores of the Salton Sea, Calif., at an average speed of 753.4 mph.

During the speed runs, the Skyray was powered by a Westinghouse J-40 turbojet engine with afterburner. Production models will reportedly be equipped with even more powerful engines.

At a press conference marking the occasion, it was revealed that the engine develops approximately 25,000 hp in flight at top speed with each turbine blade accounting for about 284 hp. The afterburner contributes 40 to 50 per cent of the power at high flight speeds.

Although the plane has a "delta" appearance, the wings are actually of the conventional swept-back type with a low aspect ratio. Douglas decided against the use of a true triangular platform in designing the plane.

The Skyray is said to weigh less than other similar U. S. planes, although it is about 10 per cent heavier than the British Hunter or Swift. This difference is accounted for by the more stringent requirements for the Skyray, such as a greater fuel capacity.

SIDE-BY-SIDE SEAT SETUP

Prime feature of the new Ryan Model 72 military trainer is the side-by-side seating arrangement for instructor and student. The plane is a military version of the Navion executive utility ship.

News of the AUTOMOTIVE

Wide World

DESTRUCTION ON WHEELS

Shown crossing a "Bailey Bridge" in a recent demonstration at Aberdeen, Md., is the 280 mm, 85-ton atomic gun. It can negotiate most existing highways and bridges, turn sharp corners, and speeds at more than 35 mph. A unique balancing system enables only five men to swing it into position.

Consolidated Finishes Its New Die Facility

Consolidated Industries, Inc., West Cheshire, Conn., recently announced the completion of a new die shop designed to help meet the aircraft industry's growing demand for aluminum, titanium, and alloy steel forgings.

This new shop provides approximately 4100 sq ft of additional floor space that will be devoted entirely to the production of special dies made to forge parts to exact specifications.

Ford Official Hits Guaranteed Wage

Although Ford has taken no official stand on guaranteed annual wages, strong indication of the company's position comes from K. W. Pierce, manager of Ford's industrial relations planning and analysis department. He says that he is personally very much opposed to the concept of the guaranteed annual wage because it would involve an entirely new philosophy affecting every phase of the business as well as a wage increase.

Mr. Pierce also commented in a talk before the Detroit Chapter of the Society of the Advancement of Management that the employer takes all the risks in the economy under the plan, while the employe assumes none. He mentioned particularly that smaller firms might not be able to meet the cost of a guaranteed wage and suggested that if they have not already done so, they should immediately begin to study the problem.

The annual wage issue will be the center of negotiations when current five-year contracts in the industry expire in 1955.

Car Excise Tax Cut Prospects Fading

Prospects for reductions in automotive excise taxes next year are diminishing. Under present laws, excises are scheduled to revert to pre-Korean levels on April 1.

President Eisenhower already has requested that the reductions be cancelled, and spokesmen for both parties indicate that they may go along with his request. There is a possibility, however, that the general excise tax structure may be overhauled, and automotive excises conceivably might be cut somewhat and the lost revenue made up by new excises on products not now covered.

Rootes Motors Cuts Prices on the Minx

Rootes Motors (Canada), Ltd., has announced a price reduction of $56 on four models of its Hillman Minx cars. The reductions were reportedly made possible by increased sales.

1953 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1953 Eight Months' Totals

MAKE	August 1953	July 1953	August 1952	EIGHT MONTHS Units 1953	Units 1952	Per Cent of Total 1953	Per Cent of Total 1952
Chevrolet	117,175	128,040	27,216	915,297	536,042	23.38	19.89
Ford	108,889	90,178	37,870	681,537	439,821	17.40	16.32
Plymouth	49,218	54,884	18,796	406,451	295,512	10.38	10.97
Buick	39,070	43,194	15,415	319,008	201,747	8.15	7.49
Pontiac	35,039	39,352	15,107	277,772	171,274	7.09	6.35
Oldsmobile	28,475	32,923	10,255	229,729	141,332	5.87	5.24
Dodge	21,988	26,856	14,989	209,227	171,544	5.34	6.36
Mercury	26,515	22,270	11,771	168,253	115,745	4.30	4.29
Studebaker	14,817	13,450	7,200	112,318	108,892	2.87	4.04
Nash	10,092	12,178	9,086	108,810	95,834	2.78	3.55
Chrysler	12,629	14,321	7,792	108,505	80,155	2.77	2.97
De Soto	10,162	11,185	5,891	83,942	61,696	2.14	2.29
Cadillac	8,429	9,752	7,510	74,642	57,471	1.91	2.13
Packard	5,110	6,470	4,736	56,119	47,279	1.43	1.75
Hudson	5,017	6,236	6,778	49,809	55,051	1.27	2.04
Willys	2,960	3,140	4,085	33,455	26,482	.85	.98
Lincoln	3,986	4,435	2,756	29,984	17,989	.77	.67
Kaiser	1,630	2,067	3,358	19,135	27,149	.49	1.01
Henry J	955	1,173	1,748	9,197	21,909	.23	.81
MG (British)	477	637	852	5,112	4,970	.13	.18
Hillman (British)	355	338	440	3,256	3,019	.08	.11
Jaguar (British)	306	370	348	2,834	1,949	.07	.07
Ford (British)	217	296	273	2,808	2,415	.07	.09
Austin (British)	201	232	432	2,375	3,386	.06	.13
Allstate	59	123	157	603	1,670	.02	.04
Misc. Domestic	43	87	242	1,311	3,278	.03	.12
Misc. Foreign	644	616	517	4,749	3,026	.12	.11
Total—All Makes	502,430	533,783	215,688	3,916,238	2,695,997	100.00	100.00

* Based on data from R. L. Polk & Co.

AND AVIATION INDUSTRIES

Opening of Carboloy Plant at Edmore, Mich., Hailed

Open house was held recently to signalize the opening of the Edmore, Mich., plant of the Carboloy Dept., General Electric Co. Built at a cost of approximately $5 million, the plant has been equipped primarily for the production of Alnico permanent magnets. Alnico production, previously handled by GE in Schenectady, N. Y., will be centered at Edmore.

Carboloy will be producing eight grades of permanent magnets and when the plant is in full swing, will turn out more than 2200 different sizes and shapes. Applications of automotive interest include: magnetic separators for industrial equipment; magnetos for aircraft engines, flywheel magnetos for outboard, single-cyl and other types of small gasoline engines; motors and generators; control equipment; magnetic drain plugs; and fuel filters.

Alnico magnets are made by two different processes: sintering—for intricately-shaped parts up to 15 gm in weight; and dry sand mold casting for all sizes above 15 gm. Melting of basic ingredients for the foundry operation is done in a battery of Ajax induction melting furnaces.

It is of interest to note Carboloy is currently carrying on an experimental program to probe the possibility of using shell molding techniques for making permanent magnets of intermediate sizes and intricate shapes. At the present time, this is purely a hand operation intended primarily to develop know-how.

One of the most recent developments stemming from Carboloy is a three-step heat treatment to insure consistently high magnetic quality. Initial step is uniform heating to 950 to 1350 deg C in box-type resistance furnaces or induction furnaces.

The new feature is quenching or cooling at a controlled rate to room temperature, on certain alloys, while subjected to a powerful magnetic field which gives directional properties to the material and permits the directional effect to become permanently frozen. The final step is low temperature aging.

1953 RETAIL CAR SALES BY PRICE GROUPS*

NUMBER OF CARS

	August				Eight Months			
	1953		1952		1953		1952	
Price Group	Units†	% of Total	Units†	% of Total	Units†	% of Total	Units†	% of Total
Under $2,000	287,251	57.45	93,167	43.80	2,118,507	54.41	1,385,409	51.77
$2,001 to $2,500	140,487	28.09	67,444	31.71	1,105,694	28.39	818,919	30.60
$2,501 to $3,500	53,733	10.74	36,559	17.19	508,698	13.06	353,572	13.21
Over $3,500	18,605	3.72	15,518	7.30	161,226	4.14	118,350	4.42
Total	500,076	100.00	212,688	100.00	3,894,125	100.00	2,676,250	100.00

DOLLAR VOLUME OF SALES*

	August				Eight Months			
	1953		1952		1953		1952	
Price Group	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total
Under $2,000	$511,729,532	49.12	$165,380,389	35.28	$3,786,614,686	45.87	$2,447,533,021	43.31
$2,001 to $2,500	313,614,171	30.10	149,049,654	31.80	2,467,619,325	29.89	1,814,685,118	32.12
$2,501 to $3,500	147,486,133	14.16	97,569,361	20.82	1,395,782,207	16.91	954,704,007	16.90
Over $3,500	68,994,561	6.62	56,704,702	12.10	605,140,879	7.33	433,563,271	7.67
Total	$1,041,824,397	100.00	$468,704,126	100.00	$8,255,157,097	100.00	$5,650,486,417	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.
†—New registrations of American made cars only. Does not include imported foreign cars.

Ordnance Developing "Pack Horse" Vehicle

Army Ordnance has under development an interesting small vehicle designed to act as a mechanized "pack horse" for infantrymen. Designated the XM-274, but nicknamed the "Mule," it consists of a chassis surmounted by a flat deck with most of the controls forward of the platform.

The vehicle is reportedly intended to carry weapons, packs and ammunition normally carried by foot soldiers. It could be operated either from a soldier walking alongside the vehicle or riding on it.

Motive power is said to be a small gasoline engine in the 10 to 15 hp range. Its design incorporates four-wheel drive and four-wheel steering.

1953 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1953 Eight Months' Totals

				EIGHT MONTHS			
				Units		Per Cent of Total	
MAKE	August 1953	July 1953	August 1952	1953	1952	1953	1952
Chevrolet	26,154	27,752	14,176	227,528	171,290	36.22	32.40
Ford	24,411	29,041	12,515	160,002	119,385	25.47	22.57
International	7,188	7,988	8,176	68,041	61,837	10.83	11.69
Dodge	6,288	6,467	10,867	59,419	68,384	9.46	12.93
G. M. C.	6,748	7,315	5,263	59,121	51,455	9.41	9.73
Studebaker	1,707	1,827	2,111	17,136	19,119	2.73	3.62
White	916	1,272	906	8,569	7,588	1.36	1.43
Willys Jeep	787	706	663	6,231	5,435	.99	1.03
Willys Truck	514	618	966	6,124	7,284	.97	1.38
Mack	613	659	687	4,675	4,919	.74	.93
Reo	258	332	320	2,468	2,124	.39	.40
Diamond T	316	303	271	2,320	2,341	.37	.44
Divco	147	212	176	1,568	1,906	.25	.36
Brockway	187	185	143	1,397	1,077	.22	.20
Autocar	138	125	98	1,182	1,022	.19	.19
Federal	81	90	70	676	570	.11	.11
Kenworth	76	132	81	559	482	.09	.09
Pontiac	49	51	18	333	343	.05	.06
F. W. D.	34	39	38	246	344	.04	.07
Peterbilt	27	17	24	121	163	.02	.03
Misc. Domestic	29	44	181	388	1,567	.06	.30
Misc. Foreign	23	16	36	183	219	.03	.04
Total—All Makes	76,673	78,161	57,786	628,287	528,652	100.00	100.00

* Based on data from R. L. Polk & Co.

News of the AUTOMOTIVE

Indianapolis Race Rules Changes Are Announced

Eight changes in rules governing the annual 500-mile race at the Indianapolis Motor Speedway have been announced. They are as follows:

1. Diesel engines will be restricted to a maximum piston displacement of 335.7 cu in., instead of 402.68 cu in., as in recent years.
2. The entry fee will be $500, instead of $250, with the entire sum being added to the prize money for the 33 cars in the starting field.
3. The benevolent fee will be $25, instead of $19.50, in order to provide increased insurance benefits. The Speedway management will continue to match all benevolent fund payments, dollar for dollar.
4. All race car bodies must meet with the approval of the technical committee in regard to providing adequate ventilation for the drivers.
5. All magnesium wheels must be Zyglo inspected and bear the AAA acceptance stamp for 1954. With the beginning of official practice on May 1, no car will be permitted on the track unless its steering mechanism and radius rods also have been Magnaflux inspected: and the technical committee is given the right to subject any other parts to such inspection if it is deemed necessary. Re-examination will be compulsory in the event any car participates in any racing event between the original date of examination and May 1.
6. The 100-mile test for rookie drivers will consist of 25 miles at each of the following speeds: 110, 115, 120 and 125 mph.
7. Six members of the crew, including the driver, will be permitted on the pit apron during the race when the car is at a standstill in the pits. This is an increase of one.
8. All pits will be assigned, from North to South, in the order of qualifying speed. If team entries of two or more cars desire adjoining pits, the average speed of the cars involved will be used to determine the pit assignments, provided such requests are made prior to the start of time trials.

Prices Unchanged On 1954 Models

Prices announced for new 1954 model cars already introduced support previous predictions that prices would not be raised despite costs. The latter have either remained high or, in some instances, have crept slightly upward in recent weeks.

Steel prices were increased recently, but this has been offset to a considerable degree by the retreat from costly conversion steel, which in some cases at its height accounted for 30 per cent of total usage. Another compensating factor is a return to partial freight absorption by major steel companies to meet competition.

One thing is certain; all companies are becoming increasingly more cost-conscious as they gear for an extremely rough sales battle in 1954, with the market expected to be off 10 to 15 per cent from this year's level.

American Wheelabrator Said Sought by Bell

Bell Aircraft Corp. is said to be seeking permission from the Securities & Exchange Commission to acquire control of an Indiana manufacturing company in order to diversify its operations in the non-military field.

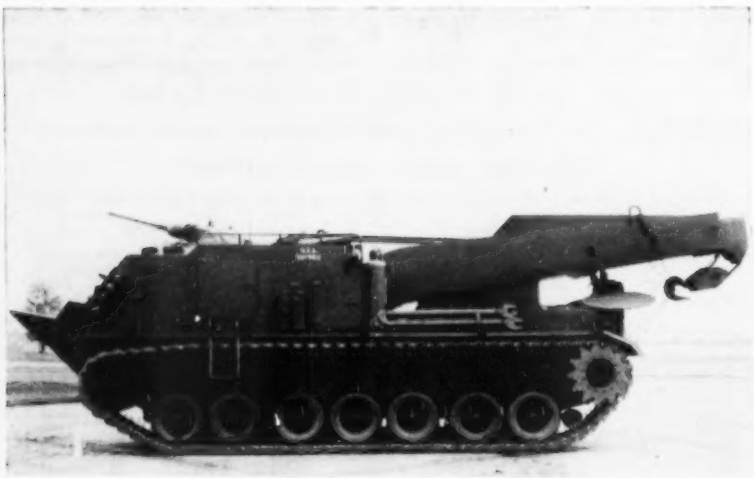
The company Bell reportedly wants to acquire is American Wheelabrator & Equipment Corp., Mishawaka, Ind. The Indiana concern is a subsidiary of the Equity Corp., New York investment company which also controls Bell Aircraft. The transaction, according to reports, would involve a shift in control of American Wheelabrator from Equity to Bell.

It is proposed that Bell would issue new stock so it could exchange 381,951 of its shares for 335,958 shares of American Wheelabrator. It manufactures foundry, sand-blasting and dust-collecting equipment and industrial abrasives.

Chrysler Completes Aircraft Project

The Chrysler plant at Evansville, Ind., recently completed an important defense assignment with the shipment of its last hull for the Grumman Albatross air-sea rescue plane. The space being vacated by the defense job will now be used for building bodies for Plymouth club coupes and three-passenger coupes.

Body-building facilities are being installed in the plant, and the first bodies are expected to be completed early in 1954.



TANK LIFESAVER

Shown here is the T-51 heavy tank recovery vehicle, which reportedly will be built by Chrysler next year at the Detroit Tank Arsenal. It is a full track-laying vehicle weighing about 60 tons and is powered by a Continental aircooled engine supercharged to deliver 1000 hp. Transmission is an X-drive type with three forward speeds and converter lockout over the greater part of the range. It has torsion bar suspension with 14 dual wheels and a steel and rubber track. While the vehicle is similar in design to the T-48 tank, it is not a conversion job, although many standard tank components are used in the general assembly.

AND AVIATION INDUSTRIES

No Design Changes Allowed On Pan American Race Cars

In connection with the Fourth Pan American Road Race, to be held Nov. 19 to 23, the Technical Committee has issued a strongly worded statement emphasizing that no modifications on the original design will be permitted. The use of racing kits and body alterations of any kind (including, for example, the use of lighter body metals) are strictly excluded.

However, for safety reasons, the following other changes will be permitted:

1. Modification of suspension and shock-absorbers.
2. Modification of brakes.
3. Removal of the muffler, but without any alteration to the exhaust manifolds. The tail pipe must end under the rear bumper.
4. Use of special tires and rims, but always of the original size.
5. Reinforcement of the inside of the body for greater protection.
6. Removal of the rear seats to install an additional fuel tank or to carry spare parts. The additional fuel tank should have one or several vent pipes leading to the outside of the body, at the rear.
7. Installation of electric fuel pump.
8. Reinforcement or improvement of the hood catch.
9. Installation of any type of stabilizer.

Other than these, the only modifications permitted are those listed in the appendage to the rules concerning transmission, rear axle, electrical equipment, and tires.

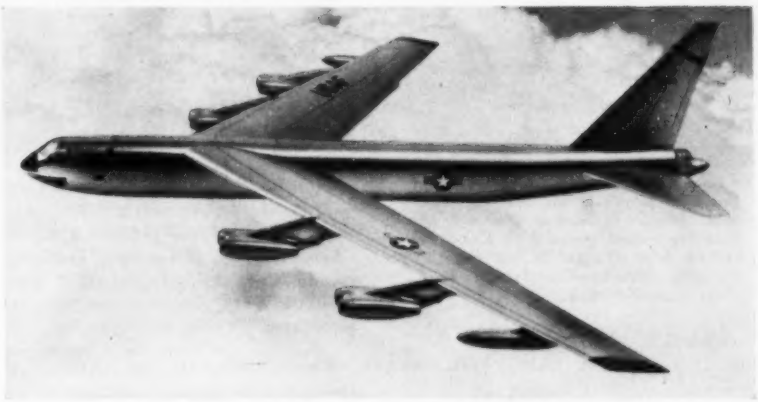
Chevrolet Expanding Muncie Operation

Chevrolet will start next January on an expansion program at its Muncie Ind., manufacturing plant. The program calls for adding 71,200 sq ft of new construction.

Forge shop capacity will be expanded by a 54,000 sq ft extension of the die shop. Other extensions of 4000 and 6000 sq ft will be added to the main plant, in addition to a 7200 sq ft addition to the office building.

Singer Unveils All-Plastic Car

Singer Motors recently took the wraps off what is reported to be the first all-plastic British car. Said to have a top speed of 90 mph, the two-door, four-passenger car is being produced for export only, but no specific price has been quoted.



REDESIGNED STRATOFORTRESS

This model of the new Boeing B-52A Stratofortress reveals the new nose and crew compartment design with side-by-side seats for pilot and co-pilot. The two prototype B-52's now flying have a tandem cockpit arrangement. Eight Pratt & Whitney J-57 turbojet engines are mounted in four sharply raked-forward pods under the swept-back wing. Auxiliary fuel tanks are located under each wing tip. Details of speed, range, and other performance have not been revealed.

White Motor Supports Maintenance Program

A national program of college training in fleet maintenance management, directed by the National Advisory Committee for Motor Fleet Supervisor Training, has been announced by that organization and White Motor Co.

The program has been made possible by a grant of funds to the committee by White. Courses will be offered at colleges throughout the country starting in January, 1954.

Bliss Acquires Die Supply Co.

E. W. Bliss Co. has announced the acquisition of the Die Supply Co., Cleveland, O., manufacturers and distributors of die makers supplies for the metalworking industry.

Newly elected officers of the company include H. U. Herrick, president; J. H. Tredinnick, executive vice-president; W. H. Garrison, treasurer; and F. J. de Lorme, secretary. These four officers hold corresponding positions in the Bliss organization.

Former Die Supply Co. officials who will continue with the organization include: John R. Fitzsimmons, founder, who will continue as chairman of the board; Warren Fitzsimmons, formerly president, who will assume the duties of factory manager; and Carl J. Theken, former comptroller, who will become assistant secretary and assistant treasurer.

Trucking Industry to Mark Its Fiftieth Anniversary

Truck Transportation Week, commemorating 50 years of trucking, was announced in Washington recently by the Independent Advisory Committee to the Truck Industry, Inc.

Representing all segments of the motor transport industry, the Committee has proclaimed November 16-22 for its celebration.

GE Announces Plans for Combustion Laboratory

General Electric Co. has announced plans to construct a $1.8 million combustion laboratory in Schenectady, N. Y., soon. Its purpose will be to aid scientists in obtaining knowledge needed to produce more powerful gas turbines for aircraft and other applications.

Ground for the facility will be broken early next year, with completion scheduled for late 1954. It will provide 14,200 sq ft of floor space.

Continued on Page 98

Men in the News

Bendix Products Div., Bendix Aviation Corp.—J. D. Meyer has been appointed sales manager of landing gear and airframe equipment, while S. R. Craig has become sales manager of fuel metering and engine equipment in the Sales Dept. of the Aircraft Section.

General Motors Corp., Motors Holding Div.—**William Harvey III** was chosen manager of branch operations.

Westinghouse Electric Corp., Elevator Div.—**W. B. Bullock** has been made eastern district manager.

Timken Roller Bearing Co., Milwaukee Div.—**George W. Curtis**, sales manager, has retired.

Electric Storage Battery Co., Automotive Products Div.—**Robert L. Sommerville** has been appointed general manager with **William C. Leingang** as his assistant.

Gemmer Mfg. Co.—**Peter Lilicy** has been appointed comptroller.

Century Controls Corp.—**John E. Drake** was chosen chief engineer.

F. L. Jacobs Co.—**Robert O. Gibson** is now industrial sales manager.

Kaiser-Willys Sales Div., Willys Motors, Inc.—**H. W. Uhl** has been made manager of fleet sales.

American Steel & Wire Div., U. S. Steel Corp.—**Edward R. Cassidy** has been made Cleveland district traffic manager.

Bassik Co.—**Richard J. Benson** has been appointed advertising manager.

Air Reduction Co.—**Howard H. Foster** has been elected treasurer.

Construction Machinery Div., Clark Equipment Co.—Clarence E. Killebrew is now manager for marketing and sales both.

Allison Div., General Motors Corp.—**J. E. Storer** has become chief engineer, transmission products; **H. W. Christenson**, chief engineer, transmission development; and **H. C. Kirtland**, chief engineer, transmission applications.

General Electric Co.—**Arthur E. Rowe** is now manager of sales in the newly formed Ballast Dept.

Torrington Mfg. Co., Air Impeller Div.—**Robert M. Gordon** has been appointed sales manager.

General Electric Co.—**Aaron M. Krakower** is now manager of electronic and high voltage transformer sales in the newly formed Specialty Transformer Dept.

Westinghouse Electric Corp.—**E. W. Loomis** has been named vice-president of the new Atlantic Region.

Nash-Kelvinator Corp.—**Bernard A. Chapman** has been appointed manager of manufacturing.

Square D Co.—**Frank Hewens** has been chosen public relations director.

Ford Div., Ford Motor Co.—The following four assistant general sales managers have been appointed: **Chester E. Bowie**, field operations; **Charles J. Seyffer**, dealer relations; **Frank J. McGinnis**, advertising, sales promotion and training; and **Guy Hamilton, Jr.**, planning and analysis.

Tensolite Insulated Wire Co., Inc.—**J. J. Dowling** has been elected as vice-president.

Norton Co. of Canada, Ltd.—W. Alexander McCune, Jr., has been appointed general sales manager.

Electric Storage Battery Co., Industrial Products Div.—**Roland Whitehurst** has been appointed general manager.

North American Aviation, Inc.—**Raymond H. Rice** and **James S. Smithson** have been elected to the board of directors.

Northrop Aircraft, Inc.—**William B. Collins** has been elected to the board of directors.

Buick-Oldsmobile-Pontiac Assembly Div., General Motors Corp.—**W. D. Darroch** was named resident comptroller of the Arlington, Tex., plant, and **H. C. Anderson** was appointed resident comptroller of the B-O-P plant at Linden, N. J.

A. V. Roe Canada, Ltd., Gas Turbine Div.—**W. R. McLachlan** has been appointed general manager.

Flexonics Corp.—**Richard H. Sabel** is now sales development manager, while **Howard W. Griesbach** becomes assistant sales manager of the Bellows Div.

National Broach & Machine Co.—**George R. Smith** has been elected treasurer; **D. Pierson Smith**, assistant secretary and assistant treasurer; and **Martin Lindner**, assistant treasurer.

Rochester Products Div., General Motors Corp.—**Edward H. Calkins** has been promoted to service manager. He succeeds **F. Dean Lowell**, now sales manager for all products.

U. S. Rubber Co., Naugatuck Chemical Div.—John E. Caskey has been elected a vice-president and general manager.

Flexonics Corp. — Thomas K. Wells has been appointed general sales manager.

E. W. Bliss Co. — Ben Snyder has been made sales engineer at its Dayton, O., office.

Industrial Filtration Co.—Robert S. Williams was made assistant sales manager.

Borg-Warner Corp., Spring Div.—**Harry P. Troendly** has been elected president succeeding **David E. Gamble,** retired. Vice-presidencies were conferred upon **M. O. Gillett** and **Arthur J. Welch.**

Auto-Lite Battery Corp., Owen-Dyneto Div.—**Martin J. Reed** has been appointed purchasing agent, and **Phillip Giblin** is his assistant.

Kaiser Motors Corp.—**L. S. MacKay** has been elected vice-president.

Clayton Mfg. Co.—**E. S. Chapman** has been elevated to the post of executive vice-president in charge of all operations, while **J. A. Cortright** has been named vice-president in charge of sales. **Perry Arant** becomes vice-president in charge of engineering.

Borg-Warner Corp., Pesco Products Div.—**Harry J. Scott** has joined as a sales engineer specializing in automotive hydraulic steering applications.

Hyster Co.—James L. Woodley has become general service manager.

Boston Woven Hose & Rubber Co., Plastics Div.—**Kenneth S. Goodyear** has been chosen manager.

General Riveters, Inc.—**Charles D. Thomas** has been promoted to chief engineer.

American Brakeblok and Kellogg Divisions, Dominion Brake Shoe Co., Ltd.—**H. L. Humphrey** has been made vice-president in charge of sales.

Bone Engineering Corp. — **Joseph Glyman** has joined the supervisory staff of the investment casting plant.

Axelson Mfg. Co., Division of Pressed Steel Car Co.—**Bruce Elliott** has been appointed manager of the Market Research Dept.

Goodyear Tire & Rubber Co. — John H. Long was elected assistant comptroller.

Rodney Metals, Inc. —Ross B. Hopkins has been selected as plant metallurgist.

Consolidated Vultee Aircraft Corp. —**C. D. Perrine** has been named assistant division manager-engineering, and **R. C. Loomis,** assistant division manager-operations, at the company's Pomona, Calif. plant.

Mathieson Chemical Corp.—**Hugh A. Bullock** has been appointed product manager for anti-freeze sales.

American Tractor Corp. — **D. A. Milligan** has been made vice-president in charge of sales.

Curtiss-Wright Corp., Metals Processing Div.—**A. O. Willis** was selected as assistant general manager.

Rochester Products Div., General Motors Corp. — Raymond A. Thon has been made director of quality control.

Fruehauf Trailer Co.—**Warren L. Pierson** has been elected a director.

Hughes Aircraft Co.—**William C. Jordan** has been named vice-president and general manager.

Axelson Mfg. Co., Division of Pressed Steel Car Co.—**John Pugh** has been appointed advertising and public relations manager.

Lear, Inc. — **Dean C. Smith** has joined in the newly created position of director of customer relations.

Consolidated Vultee Aircraft Corp. —**Thomas G. Lanphier, Jr.,** vice-president and assistant to the president, was elected president of the National Aeronautic Association.

U. S. Rubber Co., Tire Div.—Clifford H. Shirley has been promoted to advertising manager.

National Broach & Machine Co.—Max B. Mentley has been elected vice-president, manufacturing and Ben. F. Bregi, vice-president, engineering.

Westinghouse Electric Corp., Elevator Div.—**Robert H. Wagner** was chosen general application engineering manager.

Necrology

Maurice Houdaille, 73, inventor and manufacturer of the shock absorber bearing his name, died Oct. 8, at Paris, France.

Antoine Mourre, 65, race driver in America between world wars and one-time member of the Duesenberg team, was killed in a road accident Oct. 8, in France.

J. Herbert Branson, 48, administrative secretary of the Packard Motor Car Co. Pension Dept., died Oct. 6, at Detroit, Mich.

Albert B. Cunnington, 89, oldest active Goodyear Tire & Rubber Co. employe and a veteran of more than 55 years with the firm, died Oct. 1, at Akron, Ohio.

Herbert D. Tietz, 55, manager of sales of the Inco Nickel Alloys Dept. of The International Nickel Co., died Oct. 11, at Maplewood, N. J.

H. N. Nelson, 43, assistant sales manager, Findlay Div., Gar Wood Industries, was killed Sept. 29 in an automobile accident, at Moorhead, Minn.

Charles T. Ellis, quality control manager of the Ford Div. paint and artificial leather plant at the Ford Highland Park plant, died Oct. 2, at Detroit, Mich.

William Fairhurst, former engineer with Detroit automotive firms, died Oct. 2, at Warnersville, Pa.

Today's Trend in Machine Tool Design:-

For Instance

- On different sizes in combination, 4 different size pump rotors at the same time on one machine. Feeds and strokes per minute different for each of the four parts. Synchronized production for 1 rotor every 10 seconds.
- Right and left hand helical pinions, five stations for each, rough and finish cut. Parts come off the machine at the rate of one every 21.4 seconds.
- All stations on one part, cutting 54 internal spur teeth in cast iron drum. A single cut produces quality gears at the rate of one every 26.7 seconds.

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Fellows No. 10 Rotary Gear Shapers have been delivered since their introduction in 1947.
All are turning out automotive gears and parts at high production rates with maximum flexibility.

ELEVEN

more on order and under construction testify to the continued acceptance of this machine and its ability to turn out identical parts on all stations or ten different parts on the same self-contained production unit.

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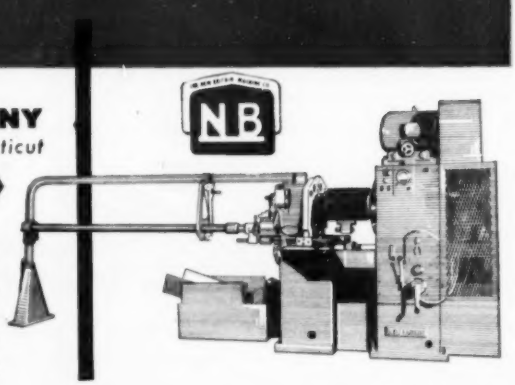
A new approach in single spindle machines

The New NEW BRITAIN MODEL 126

Remarkable for mechanical simplicity and simplicity of operation. In addition to many features guaranteeing quick set-up, it has the power, performance, accuracy and rigidity for long as well as short runs.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division, New Britain, Connecticut



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Machines for Making Progress
Automatic Bar and Chucking Machines
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Lucas Horizontal Boring, Drilling and Milling Machines
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Whatever your problem—whether you need creative engineering for "just an idea" or precision or volume production of a finished product—"Look to Lycoming!"

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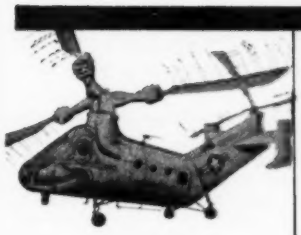
"Sinews" to give cars "go"

For vital automotive parts—precision-machined components that can "take it," year after year, leading *automobile manufacturers like* FORD, *have long looked to Lycoming.*

"Blasts" for jets

To precision-produce tough, unfailing major components that put the "blast" in its superb J-47 jet engine—GENERAL ELECTRIC *looks to Lycoming.*



How a helicopter hangs by its "elbows"

For flexible "elbows"—rotor assemblies that control the amazing maneuvers of its H-21 "Work-Horse" Helicopter—PIASECKI *looks to Lycoming* for precision production.

New "ticker" for tanks

For a dependable tank "heart"—500 horsepower's worth of rugged, air-cooled engine—U. S. ARMY ORDNANCE *looks to Lycoming*, pioneer in the air-cooled engine field.

How a jet engine runs on its "nerves"

To produce the auxiliary "nerve center" for its J-40 jet engine—a complex gearbox that transmits power to vital accessories—WESTINGHOUSE *looks to Lycoming.*

"Air horses" for lifesaving over the sea

To help swell the production of the mighty Wright-Cyclone engine—dependable "horses" for air-sea rescue work—CURTISS-WRIGHT *and the* U. S. AIR FORCE *look to Lycoming.*

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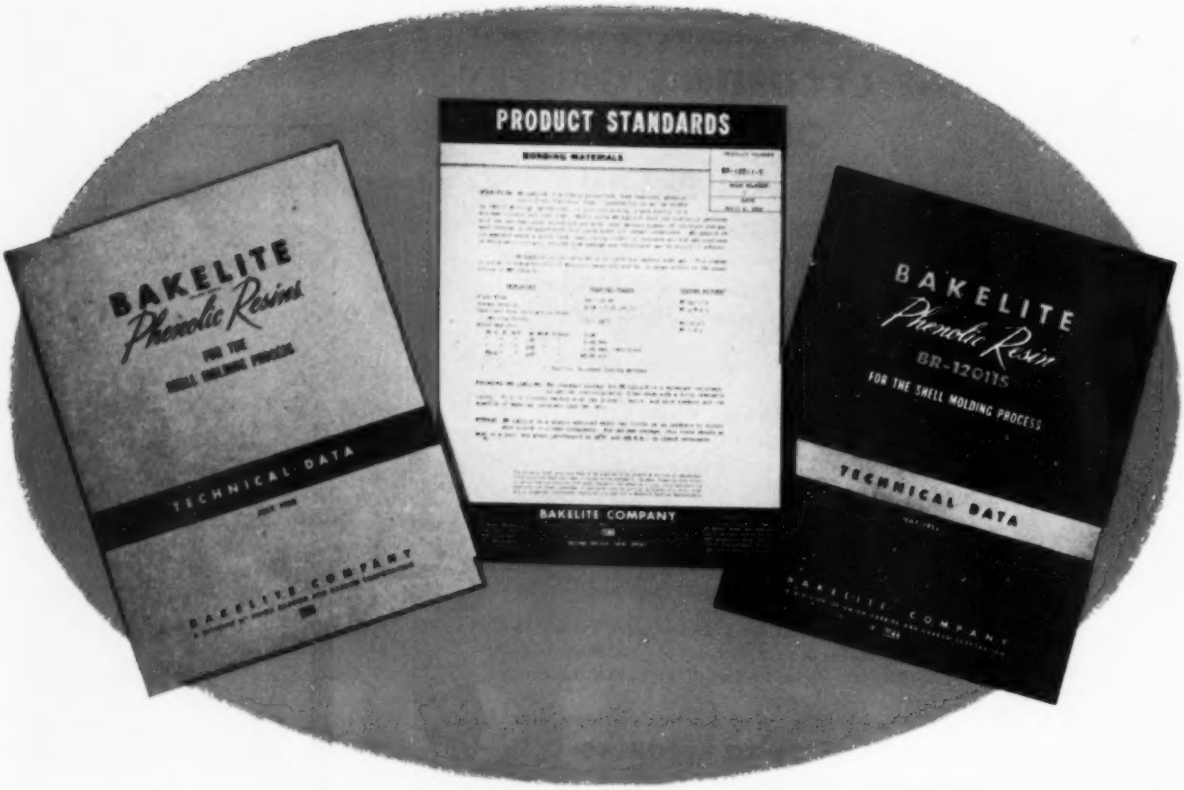
AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION



NEW INFORMATION KIT

Tells How You Can Benefit With **SHELL MOLDING**

This literature provides basic data about the shell molding process and the BAKELITE Phenolic Resins developed for it. One pamphlet features the new BAKELITE Phenolic Resin BR-12011S. Shell molds bonded with this resin have these advantages:

- **They reach minimum usable strength faster in the curing operation than molds bonded with ordinary resins.**
- **They retain their strength for longer periods at curing temperatures.**
- **They permit greater leeway in curing time, the most critical period in mold making.**
- **They resist the tendency to distort on ejection from the hot pattern plate, insuring better mating of mold halves.**
- **They are more dimensionally stable, and resist deformation during the pouring operation.**

These features point the way to increased foundry efficiency with shell molding. Send for your information kit and get the details now on BR-12011S. Write Dept. SL-59.

THE SHELL MOLDING PROCESS FOR FOUNDRY CASTINGS

The shell molding process uses thin, lightweight shell molds made of fine-grained sands bonded with BAKELITE Phenolic Resins. This process provides:

- **Ferrous and non-ferrous castings with almost pattern-smooth surfaces.**
- **Pieces cast to closer finished dimensions—tolerances as close as .003 to .005 inches per inch.**
- **Higher percentage of sound, uniform castings that cuts down on rejects.**
- **Less machining of castings, reducing production costs.**

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PHENOLIC RESINS FOR SHELL MOLDING
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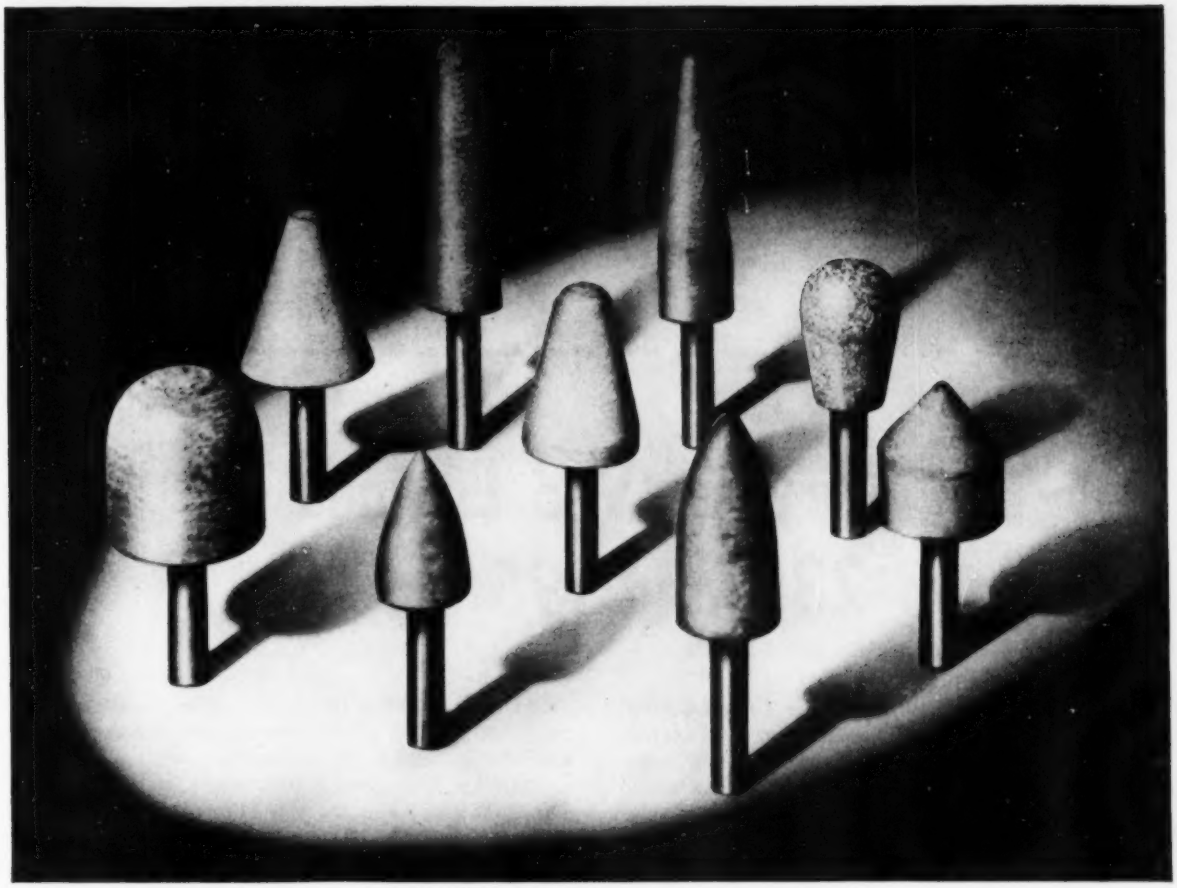
NOW... NEW LONGER LASTING

NU-TEX MOUNTED POINTS



assure finer finishing at lower costs

Here's how NU-TEX points can save you time and money on hundreds of precision finishing jobs.

CLEANER, FASTER GRINDING POLISHING AND DEBURRING

Unlike other mounted wheels, new, longer lasting NU-TEX Mounted Points will grind, polish and deburr all types of metals and plastics *in one simple operation.* Their soft, cushion-like action produces even, extremely smooth finished surfaces quickly and easily . . . eliminates the need for filing, scraping, sanding or burnishing . . . speeds up production on all types of precision instruments and machinery.

FEWER REPLACEMENTS, LESS DOWNTIME

Bonded together with a special resin under an exclusive manufacturing process, NU-TEX Mounted Points assure a longer life and better polishing and deburring action than any other product of their kind. Reliable tests prove that NU-TEX Points last longer under continuous operation . . . cut cleaner and smoother . . . eliminate clogging or loading, even on softer metals.

PROMPT DELIVERIES, WIDE SELECTION

When you specify NU-TEX Mounted Points, you eliminate costly shipping delays . . . get prompt service on every order . . . choose from a complete line of popular grit sizes for every purpose. Try them and see. Write now for descriptive folder. Or, better yet, have a NU-TEX Representative show you these new mounted points in action . . . saving time and money *on the job!*

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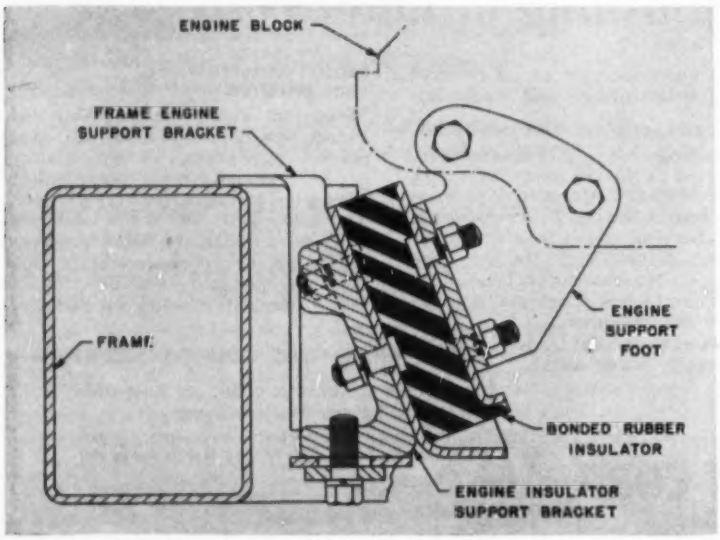
New Yorker DeLuxe sedan, one of the models powered by the 235-hp engine.

Chrysler V-8 Engines Have 235 and 195 Hp for '54

THE new Chryslers for 1954 introduce a 235-hp and a 195-hp version of the FirePower V-8 engine plus numerous mechanical advancements, combined with restyled exteriors and interiors. In addition to new V-8's and new styling, engineering features include the PowerFlite fully-automatic transmission (introduced in 1953 Imperials), a new Airtemp air conditioning unit, power steering and power brakes, and new anti-roll front suspension.

There are five models with a total of 20 body styles. The lines this year are the Windsor DeLuxe, New Yorker, New Yorker DeLuxe, all on a 125½-in. wheelbase; Custom Imperial with a wheelbase of 133½ in. and the Crown Imperial line with a wheelbase of 145½ in.

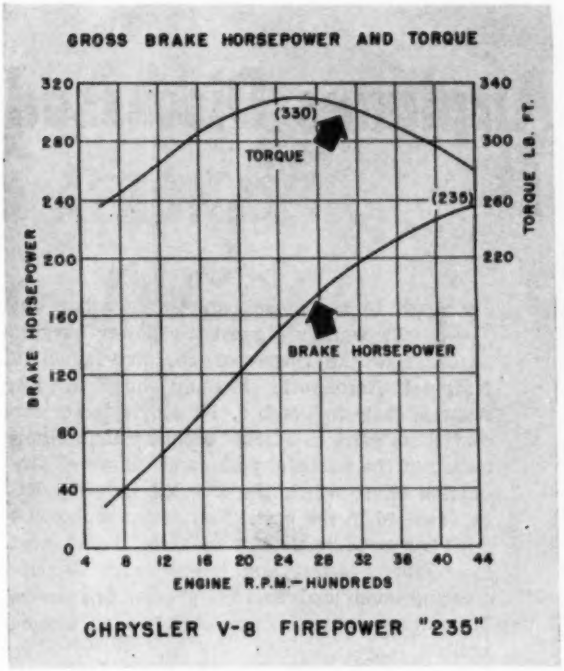


Shear-type front engine mounting.

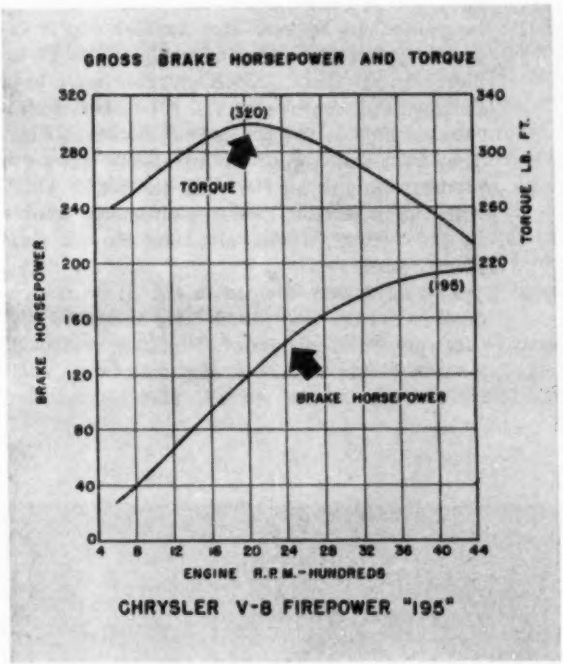
Windsor DeLuxe models are available in six-passenger sedan, club coupe, special Newport hard-top coupe, convertible coupe, Town and Country wagon and eight-passenger sedan. New Yorker models are available in six-passenger sedan, club coupe, special Newport club coupe, Town and Country wagon and eight-passenger sedan; and New Yorker DeLuxe models in six-passenger sedan, special Newport club coupe and convertible coupe.

Custom Imperials are available in six-passenger sedan, Newport and six-passenger Town limousine models. The Crown Imperial is available in either the eight-passenger sedan or limousine model.

Exterior styling features new grille medallions, hood crests, bumpers and



CHRYSLER V-8 FIREPOWER "235"



CHRYSLER V-8 FIREPOWER "195"

chrome trim "eyebrows" above the headlights. Directional lamps are in the chrome frame below the headlamps. The lamp lenses feature a different idea in design with arrows set into the plastic lenses.

Tail lamps are new, as is the one-piece, wrap-around rear window. The separate tail, backup, and stop lights are combined into one large, vertical unit. Grille treatments vary for all models, but retain a family resemblance.

Taking advantage of the inherent possibilities of the Chrysler OHV, V-8 engine, two horsepower versions are made available in the 1954 line—195 hp on the New Yorker; 235 hp on New Yorker DeLuxe and the two Imperial models—without affecting basic design, displacement or compression ratio. Both engines continue to operate on regular grade service station fuels.

On the 195-hp version the transition from the previous 180-hp rating was made rather simply. The changes in the main are as follows: enlarging intake valve and port diameter by ⅛ in., and enlarging exhaust valve and port diameter by ¼ in. These changes, together with some other minor modifications, have increased breathing capacity materially.

The change from 180 hp to 235 hp on New Yorker DeLuxe and Imperial engines, on the other hand, required six major engine modifications, primarily to increase breathing capacity. These changes may be listed briefly as follows: adoption of a four-barrel carburetor; larger air cleaner, three in. larger in diameter, with filter case flared farther and deeper; on intake manifold — cross sectional areas of the branches have been increased and a secondary pair of risers added; on exhaust manifold — diameter of outlets has been increased from 1⅞ to 2 in.; on the cylinder head — intake valve and port diameter enlarged by ⅛ in., exhaust valve and port diameter enlarged by ¼ in.; in addition, a dual exhaust system has been adopted to further reduce back pressure and improve silencing.

Smoother engine operation on the V-8's now is obtained through a reduction in low speed engine vibration by the introduction of a newly designed shear type front engine mounting.

Windsor DeLuxe models are powered by Chrysler's six-cylinder Spitfire engine which develops 119 hp at 3600 rpm.

Adoption of a high-roll center front suspension of non-parallel control arm design is said to improve control, stability, and riding comfort. This has been achieved by lowering the inner pivot of the upper control arm and lengthening the steering knuckle support.

A smoother, more "solid feel" ride is provided by a stiffer frame, redesigned front and rear body mountings, new rear spring mountings, and added insulation for the cowl and underbody.

The PowerFlite fully-automatic transmission is standard equipment on all V-8 models, and optional on the Windsor DeLuxe.

Thompson Purchases Bell Sound Systems

Purchase of Bell Sound Systems, Columbus, Ohio, has been announced by Thompson Products, Inc. The Columbus company is a prominent manufacturer of high fidelity amplifiers and tape recorders.

Bell will retain its present identity, continuing to operate in Columbus as a wholly-owned subsidiary of Thompson.

Tomorrow's Airplanes Discussed

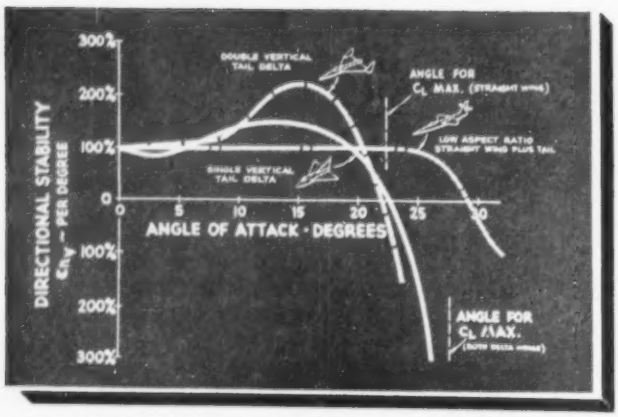


FIG. 1—Directional stability vs angle of attack.

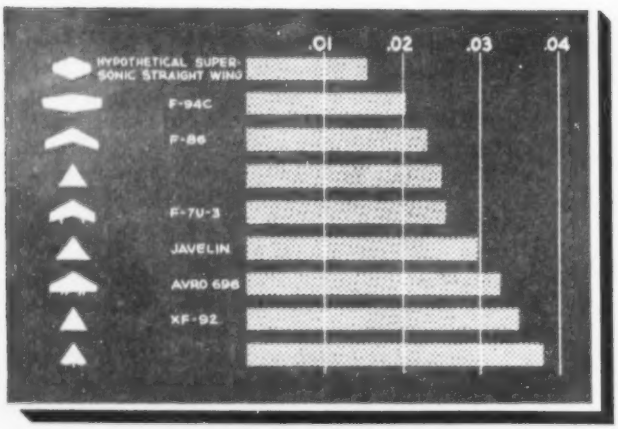


FIG. 2—Total area/gross weight.

How to make each air power dollar buy the world's biggest air power bargain was the theme of the five-day SAE National Aeronautic Meeting held in Los Angeles early in October. No single factor can contribute more to defense economy than elimination of the wasteful peaks and valleys of production effort which the aircraft industry has experienced in the past. New and complex aircraft required to defend the free world must fly farther, faster, and higher with ever-increasing bomb loads and far greater fire power. They are an expensive necessity in an atomic age.

Once again automotive engineers from all parts of the United States and Canada came in large numbers to hear and consider expert information on the costs and complexities of tomorrow's airplanes. "SAE planners have been particularly sensitive to the production-design relationships in the aeronautic industry today. They have seen the import of having engineers produce designs on the drawing board which will give production men a minimum of trouble in the factory," SAE president Robert Cass pointed out.

Two days were devoted to the Aircraft Production Forum with round table and panel discussions of the economics of tooling, control of manufacturing costs, forming, machining, quality control, change control, plant layout and

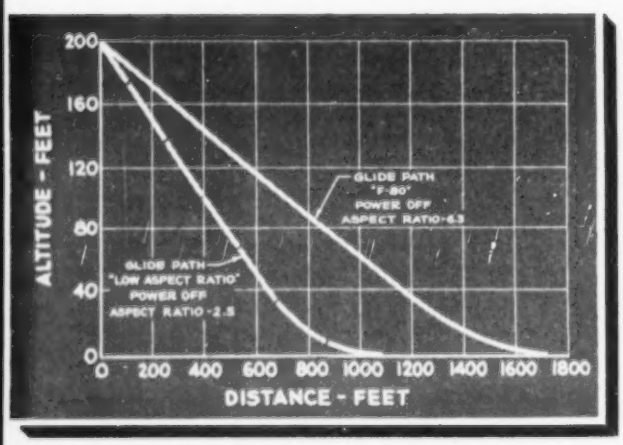


FIG. 3—Glide angle comparison.

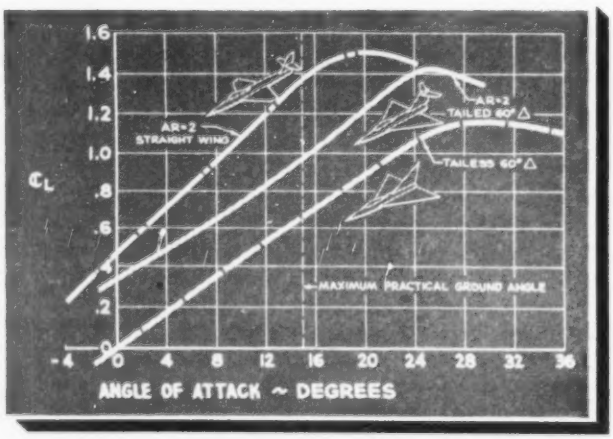


FIG. 4—Maximum lift comparison (landing configuration).

at SAE AERONAUTIC MEETING

By R. Raymond Kay

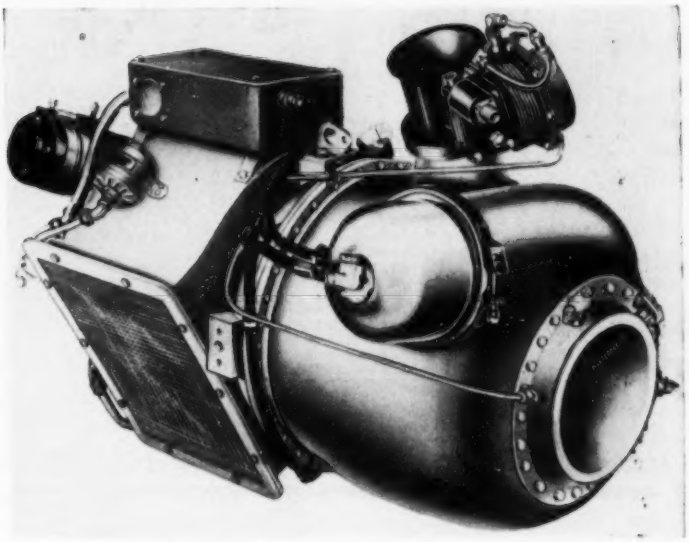


FIG. 7—One of two new models of lightweight gas turbines developed by AiResearch Mfg. Co. This model is a compressed air supply unit which weighs 170 lb and has an output rating of 170 hp.

engineering, materials handling, and procurement. Three days were devoted to formal sessions for the presentation of basic technical papers on aircraft structures, landing gears, fuel systems, power plants, cooling, electrical equipment, accessories, and operations. Attendance at one formal section was limited to specially cleared SAE members and personnel of the U. S. Armed Forces and Government agencies who heard about new developments in carrier landing techniques and in the design and construction of top speed aerial drones.

Lockheed Aircraft Corporation's chief engineer Clarence L. "Kelly" Johnson gave a most interesting paper, "Airplane Configurations for High Speed Flight." He concentrated mainly on the problem of wing planforms and overall aircraft configurations for the Mach number range of zero to two. Here are highlights of Johnson's thinking on delta, sweptback, and straight wing shapes:

Delta Wing—"There has been very limited experience obtained with delta wing type aircraft. . . . No delta wing airplane has obtained the high speeds reached by rocket powered straight or swept wing research aircraft. In fact, few have reached speeds obtained by service aircraft. Within the next few years this situation will, no doubt, be changed."

"Very low maximum lift coefficients (are) the chief drawback of the type. . . . The delta airplane has no patent on the structural advantages that go with low aspect ratio."

"The delta airplanes in the main have been the so-called tailless type. . . . While they may not have horizontal tails, they make up for it by requiring terrific vertical tails. . . . Many of the delta wing types have as much combined surface area, without horizontal tails, as conventional aircraft which have such surfaces."

Deltas have "higher surface area per pound of the gross weight" than conventional types. "For supersonic aircraft, this is a very undesirable trend."

Swept Wing—"The swept wing planform has demonstrated good success in the high sub-sonic and transsonic speed ranges. As the sweep angle of the leading edge is increased for high supersonic speeds, a number of undesirable characteristics of the swept wing become apparent. . . . It is not believed that for high supersonic speeds the purely swept wing will be a contender with the straight and delta types."

Straight Wing—"The wing type referred to as

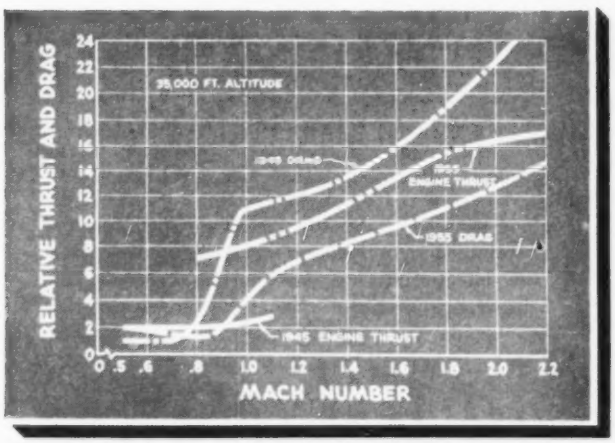

RELATIVE THRUST AND DRAG
35,000 FT. ALTITUDE
1945 DRAG
1955 ENGINE THRUST
1955 DRAG
1945 ENGINE THRUST
0 2 4 6 8 10 12 14 16 18 20 22 24
.5 .6 .8 1.0 1.2 1.4 1.6 1.8 2.0 2.2
MACH NUMBER

FIG. 5—Thrust and drag, 1945 and 1955 fighter aircraft.

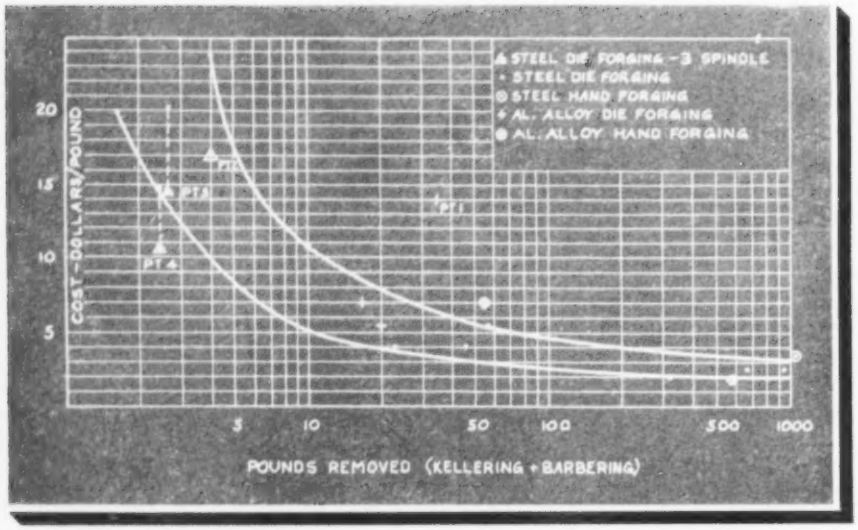


FIG. 6—Keller contouring cost (single spindle).

'straight' is essentially zero swept to a line between 25 per cent and 70 per cent of the wing chord. The wing may be tapered, and probably must be for structural reasons. . . .

"The straight wing airplane has fundamentally better landing and take-off characteristics than the delta or swept type. This is because, even in the extremely low (wing) thicknesses, it is possible to obtain lift coefficients very substantially higher than those of the delta. Because of the higher maximum lift, it is possible to use much higher wing loadings for given take-off and landing performances."

"If we are going to compare airplanes, let us compare them on the basic criterion that the field lengths are the same regardless of wing planforms. Let us further compare them in that they must do the same mission, with the same equipment or payload."

"The straight wing airplane will have its basic stability advantages over the delta at high angles of attack, while having similar stability at high speed."

The accompanying charts (Figs. 1 to 5) show the advantages of the unswept, very thin wing over other types, evaluated on a strictly comparative basis for a flight regime that reaches well into supersonic speeds.

Present developments indicate the probable use of ultra high strength steels in the tensile strength range from 250,000-300,000 psi for some major strut components of the modern landing gear, according to G. E. Beringer, Bendix Products Div., Bendix Aviation Corp. He said that aluminum alloy forgings will continue to receive serious design attention, since full advantage of the ultra high strength steels cannot always be realized. In many instances, sections designed for minimum weight are too thin for feasible production.

Until forgings are available with reduced parasitic weight, the landing gear producer is limited to machining operations as a method of excess stock elimination. The production use of the three-dimensional contour milling machine, such as a Keller, offers one practical solution to this problem at the present production schedule levels. Some indication of the cost of Keller contouring may be obtained from Fig. 6, which is a plot of cost data available for a limited number of experimental and production items. The rather wide spread between the arbitrary limits defining the scatter of the cost data for Kellering steel parts is evidence that factors in addition to pounds of material removed have a significant effect upon the operation.

Acceptance of the delta planform for aircraft operating at supersonic speeds establishes certain advantages, such as external compactness and simplicity, excellent maneuverability, and others close to the ideal, but raises questions as to how to arrange the structural material inside, it was reported by H. U. Schuerch, Aerophysics Development Corp., Pasadena, Calif. He said that development of an internal "egg-crate" type of structure is inadequate, since the delta wing already has been found to function more on the order of a cantilever plate than a simple beam; and operation, loading, and other factors set up a completely different series of stresses and strains.

Temperature effect on aircraft structural design was discussed by E. H. LaBombard, assistant supervisor, structures section, Douglas Aircraft Co., Santa Monica, Calif. Much has been written in the last few years about the "thermal barrier." This is perhaps an unfortunate holdover from the short-lived "sonic barrier" and it might be well if we could guide our thinking away from it, he said.

"At one time the drag forces on an airplane flying at the speed of sound were determined and it was found that no known powerplant could deliver sufficient thrust to overcome these forces. Not long after the term was popularized aircraft designers developed airplanes and airfoils with less drag than before, powerplant designers created engines with more thrust than before, and the 'sonic barrier' was shown to be nonexistent. The 'thermal barrier' concept is similar.

(*Turn to page* 106, *please*)

New index drilling machine in operation. Index pins underneath the part locate the rib on the machine; the cone-shaped pressure foot holds the part in place for drilling.

Special Machine Locates and Drills Rivet Holes

An index drilling machine that locates and drills pilot holes for rivets in structural parts for B-47 Stratojets is said to be averaging savings of about 78 per cent in man-hours at Boeing Airplane Company's Wichita (Kan.) Division.

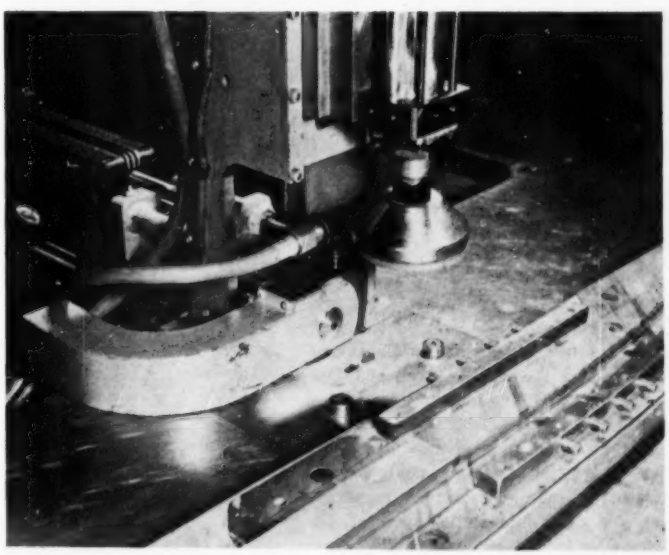
Operation of the machine is as follows: The part to be drilled is placed on an index tool and a coordination hole on the part is slipped over a pin on the tool to make sure that all similar parts are drilled identically. Index pins along the side of the tool are located directly below the spots where the holes are to be drilled. As the part and tool are hand fed through the machine the index pins engage a cycling mechanism on the machine. This begins a procedure of positioning the part and tool for drilling, clamping them in place, drilling the hole, withdrawing the locating mechanism and releasing the tool and part so that they can be moved forward until the next index pin is engaged.

The cycling mechanism consists of two triggers, the first of which is tripped by the index pin as the tool is being fed through the machine. The tripping of the first trigger locks the second one in place, stopping the tool and part in position for drilling. Once the part is stopped a pressure foot holds it firmly in place while the drilling is being done.

When the hole is completed the second trigger releases, permitting the tool to be moved until the next index pin trips the first trigger and the operation is repeated.

Vertical location of the hole is set by adjusting the drill head to a predetermined height above the table of the machine.

A license to manufacture the drilling tool has been sold by Boeing to the Hufford Machine Tool Co.



Underside of the index tool used with the drilling machine. Two triggers on the table engage pins on the tool while the two metal buttons on the table run along channels in the tool as it is fed through the machine.

Automotive Applications Featured

FROM its inception some eight years ago the National Conference on Industrial Hydraulics has grown enormously in stature, and early last month it attracted some 600 specialists to the Ninth Annual Conference held in Chicago. Although the program was designed to cover the gamut of industrial applications of hydraulics, it is significant that most of it was specifically of automotive interest. Beyond a doubt the conference, sponsored by Illinois Institute of Technology and Armour Research Foundation, has become a must from the standpoint of automotive participation.

Wide Variety of Subjects

Some of the sessions — Motor Vehicle, Aircraft, Tractor, Components — were strictly automotive in scope. On the other hand, the sessions dealing with heavy presses, pumps, and machine tools certainly held just as much of interest to automotive people.

Special mention is made at this point of the paper "Friction and Wear Phenomena in Hydraulic Equipment" presented by Green and Teichman, Armour Research Foundation. It is a summary of historic as well as current literature on the subject and from that standpoint should be of interest to engineers and research workers throughout the industry. M. E. Merchant, Cincinnati Milling Machine Co., and J. Rozner, Aetna Ball and Roller Bearing Co., contributed to prepared discussion. Merchant touched on some recent studies at Cincinnati indicating an interesting correlation of values of the coefficient of friction with corresponding values of shear/hardness ratio for combinations of metals capable of forming solid solutions. Rozner noted that spalling and fatigue failure of ball and roller bearings have been considerably reduced, if not entirely eliminated, by refinements in manufacturing techniques—further improvements in surface quality, adoption of advanced honing and lapping methods.

Interest Centered on Safety Fluids

It turned out that the session on so-called nonflammable fluids or safety (fire-resistant) fluids, as the experts prefer to call them, became the hottest item on the program. This was to be expected considering the recent debacle at Livonia as well as the more or less frequent fires incident to the operation of special equipment such as press welders, die casting machines, and forging equipment. Although industry does not boast about it, apparently scattered fires are a matter of common occurrence here and there.

A single paper by James Robinson, Vickers, Inc., served to rally an impressive array of talent for discussion. Robinson's paper served in one respect to outline the characteristics of an ideal safety fluid, realizing that no single product could possibly meet the requirements of a perfect fluid. The point is that safety fluids are here to stay and should broaden in use wherever they meet the requirements of existing equipment.

According to Dr. W. H. Millett, Carbide and Chem-

Effect of Synthetic Fluids on Hydraulic Components and Circuits

by James Robinson
Vickers, Inc.

THE art of applying industrial hydraulics embraces three distinct and entirely different fields. They are the aircraft, the mobile, and the machine tool fields. Naturally there are many diversifications in each of these fields, some of which may overlap. The effect of the hydraulic medium used differs widely depending upon the application. Recent analyses indicate that while certain characteristics are of prime importance in all fields, the secondary or detailed characteristics of the fluid vary widely both in desired results and the importance of these results.

During one analysis the industrial application field was divided into two sections, one of which was classified as standard machine tools and the second one as hazardous industrial equipment. This latter category embraced, in particular, diecasting machines, hydraulically operated welding machines, hot forging presses and furnaces. Obviously fire was uppermost in the engineer's mind when these particular machines were selected as hazardous, and for this reason non-flammability (to a reasonable degree) was a prerequisite of the hydraulic medium to be used. Even in this machine category, however, this characteristic was rated second to a single item that was outstanding in every field of hydraulics; i.e., the medium used must have good lubricating qualities with the presently available materials for bearings and other rubbing surfaces.

Hydraulic Problems of Large Forging Presses

by E. V. Crane, Chief, and W. R. Jackson,
E. W. Bliss Co.

THE Air Force tooling program which aims to increase press capacity for the production of large forgings for aircraft has raised many

at Hydraulic Conference

By Joseph Geschelin

icals Co., safety hydraulic fluids are not strictly nonflammable, some may even develop flammable vapors under high temperature conditions. However, they can be classed as fire resistant, safer than conventional oils. Several different types of such fluids are currently available: chlorinated hydrocarbons, phosphate esters, aqueous fluids, and soluble oil emulsions. Each one has different properties, each one has distinct applications and, in general, it is necessary to know the whole story before considering an application on existing equipment. Dr. Millett and the other experts agreed, in effect, that safety fluids require special know-how both in application and maintenance procedures and maintenance people will have to be trained in their utilization.

Mechanical seals for hydraulic systems are at a high state of perfection, according to Carl E. Schmitz, Crane Packing Co. Nevertheless, it must be recognized that all mechanical seals exhibit some degree of leakage and maintenance methods must be initiated to promote good housekeeping. Moreover, maintenance men must be trained to acquire a know-how in the repair and replacement of seals. Some synthetic fluids are quite difficult to seal, some have a tendency to ruin seals quickly. Schmitz mentioned that chlorinated formulations, in particular, destroy polymers quickly. He recommended the use of Teflon in mechanical seals as a means of preventing this condition.

Don P. Morrell, Ford Motor Co., stated that Ford has been using safety fluids in die casting and press welding equipment for some time and contemplates extending this practice. He drew attention to a major problem—that of mechanical seal leakage, pointing out that loss of this extremely expensive material is quite serious. In fact, on some equipment it is questionable whether the costly fluid can be justified solely on the ground of safety. According to Morrell, viscosity index of present safety fluids is too low and should be increased; they are more difficult to filter with available equipment; and are subject to rapid wearing out due to low film strength.

By coincidence, the October issue of *Lubrication*, published by The Texas Co., dealt with low temperature hydraulic operations in automotive equipment such as cranes, bulldozers, tractors, snow plows, and lifts. The study covers investigation of various factors involved in the utilization of hydraulic fluids and reaches the following conclusions:

1. That hydraulic systems should be supplied only with high quality oil of the viscosity grade recommended by the equipment manufacturer.
2. Hydraulic systems that must be capable of starting at unusually low temperatures require oils of sufficiently low viscosity and pour point to assure adequate feed to the pump while oil is cold.
3. Hydraulic oils having high viscosity indices give most assurance of good low temperature starting characteristics, combined with adequate lubrication, and a minimum of pump slippage at higher temperatures.

problems by reason of the great size of the units. Distribution of press building contracts among a number of large concerns introduced different points of view with interesting differences in solutions. While structural and shipping problems have been extraordinary, these have been quite thoroughly discussed and the concern here is with hydraulic problems. Underdrive vs. Overdrive.—Whether the hydraulic cylinders should be above or below the die space raised questions of line lengths, subsoil stability, crane height and foundation depth economics. The solutions are about equally divided on this problem. Unusual loading and balancing requirements were introduced.

Water or treated water vs. oil or other hydraulic media raised some interesting discussion. Lubricity, corrosion, wire drawing, fire hazard and maintenance costs contribute to decision with indeterminates still present.

Accumulator central systems vs. self-contained systems of various sorts opened much room for differences in thinking. It is necessary to put very large presses together with smaller presses in ways which will give maximum flexibility for a variety of work and protection against shut-down in case of individual failures. Efficiency and cost of operation raise questions not yet well defined.

Some critical questions have been raised as to why all of the differences could not have been solved in advance and incorporated in a common design. Some heart-breaking delays have been experienced due to differences in thinking but, in general, excellent progress has been made and all units in progress should prove effective.

Hydraulic System of the Golden Jubilee Ford Tractor

by Harold L. Brock
Ford Motor Co.

PARAMOUNT among the problems of designing a farm tractor is the difficult task of planning a suitable hydraulic system of controlling implements. Such a system must be adequate in construction and operation, simple to service, and economical to produce in order to properly fulfill design objectives.

(*Turn to page* 134, *please*)

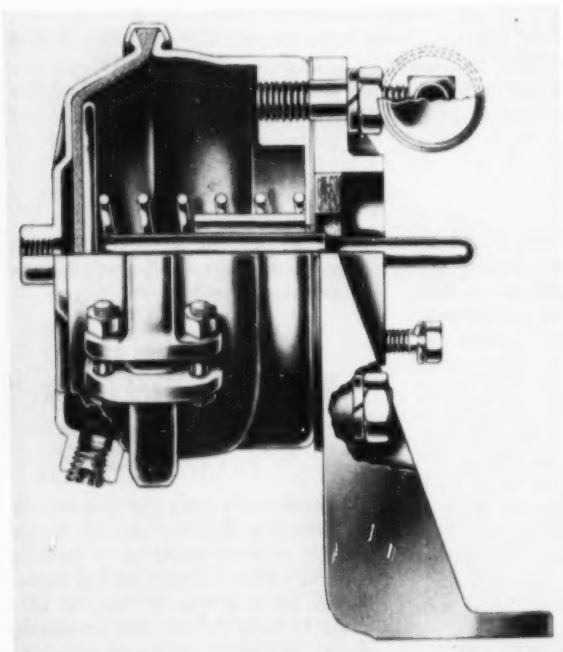
New Air Brake System for Lightweight Vehicles

INTRODUCTION of an air brake system designed specifically for lightweight motor vehicles, with components scaled down correspondingly in size and weight, has been announced by the Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio. An outstanding feature of the system is a compact, lightweight air compressor of unique design, said to be the forerunner of a new line of air compressors currently being developed by the company.

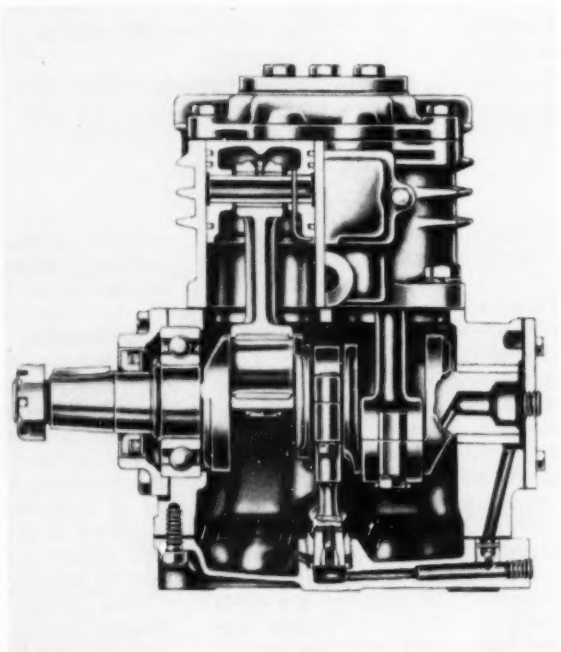
Basic arrangement of the braking system includes a recommended reservoir capable of providing sufficient reserve of stored air pressure in the event of engine failure. Tests indicate that, on the average, ten 60 psi emergency stops can be made with the air storage reservoir at the minimum operating pressure of 85 psi, with engine shut off, and with no delivery from the compressor to the air storage reservoir.

Braking response is said to be excellent, the system being capable of an emergency application of 60 psi in 0.13 sec from the time the brake treadle is depressed. In the case of a tractor-trailer unit, the corresponding time interval at the trailer brake chamber is 0.23 sec.

Designated as the Tu-Flo 300, the new compressor is of two-cyl reciprocating piston type, available in two styles—self-lubricated, weight 14 lb, height 8½ in.; or engine lubricated—weight 12 lb, height 7½ in. It has 1¾ in. bore, 1 5/32 in. stroke, and has maximum operating speed of 3000 rpm. The crankshaft is counterbalanced and has ball type front bearing. Design features include: permanent mold aluminum crankcase, cast iron cylinder block and head, and alloy cast iron crankshaft.



Air-hydraulic actuator which couples to the master cylinder by means of a combination master cylinder adapter and mounting bracket.



Tu-Flo 300 compressor which has a permanent mold aluminum crankcase, cast iron cylinder block and head, and alloy cast iron crankshaft.

The compressor is air-cooled, quiet in operation, and may be driven in either direction. Compact design, stemming from high operating speed, simplifies installaation problems on the relatively small high speed engines used in trucks of lightweight class. It is also claimed that relatively small power is required for both loaded and unloaded compressor driving conditions, field tests indicating that unloaded conditions exists from 50 to 90 per cent of operating time.

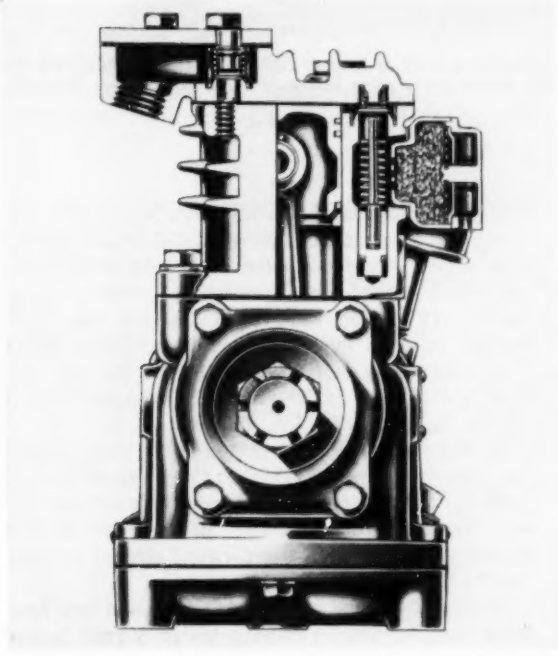
Attention is drawn to two major features developed for this compressor. One is the design of automatic spring-loaded inlet valves of flat disk type, located in the cylinder block. This location permits more efficient cooling of the cylinder head, also contributes to increased volumetric efficiency. From a structural standpoint this valve location eliminates complex coring of cylinder heads and permits a simplified unloader valve mechanism.

The unloader mechanism, the second major feature, consists of two spring-loaded pistons located in the cylinder block. When air pressure reaches the desired maximum, the unloading pistons move up to hold inlet valves open. When air pressure drops to the minimum valve, the spring forces the pistons downward, closing the valves and resuming compression. Air pressure acting on the unloading pistons is controlled by a governor.

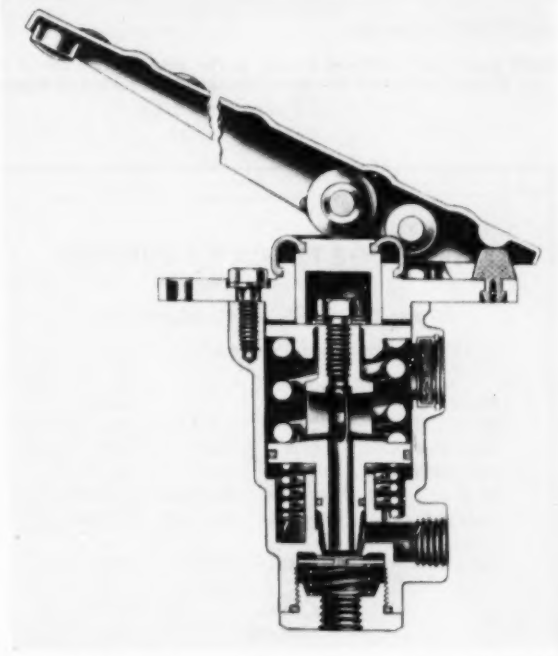
The Type E brake valve includes a treadle type pedal, air delivery to the air-hydraulic actuators being graduated in direct relation to the treadle position up to 75 psi delivered air pressure. Full system reservoir pressure is delivered if the treadle is depressed past the 75 psi point. Constructional details of the valve are designed for compactness and light weight. The body is die cast aluminum; treadle is a steel stamping with corrugated, non-skid tread. A unique feature is the combination inlet and exhaust valve, consisting of a rubber covered guided metal disk which is pushed from its seat by the exhaust valve plunger. This design conserves space and is a simple and positive type construction for this vital part. The initial treadle angle is only 25 deg, dictated by the toe board inclination of trucks in the lightweight class, which ranges between 30 and 45 deg.

A completely new line of air-hydraulic actuators allows selection of proper sizes and mountings to suit all hydraulic master cylinders. Actuators are simple and compact and are directly coupled to the master cylinder by means of a combination master cylinder adapter and mounting bracket. Maximum hydraulic line pressures are predetermined and positively controlled within safe limits. They provide full braking efficiency over the entire working stroke range and modern clamp ring design reduces overall size. They are dirt proof, require no lubrication and practically no maintenance.

The actuators are available in six different sizes ranging from 16 sq in. to 50 sq in. effective area. Consequently, the air brake system is able to produce any hydraulic line pressure up to the maximum desired while retaining the standard air brake system air pressure of 85 to 105 psi.



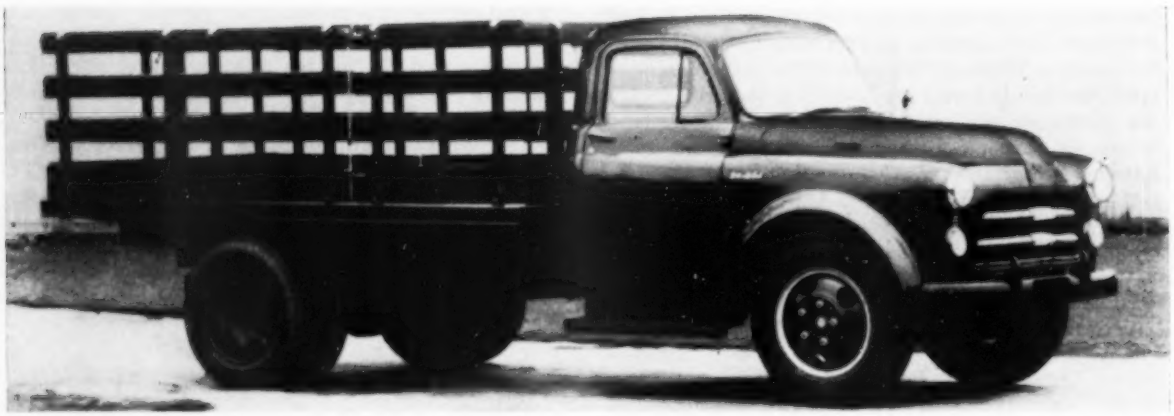
Part-cutaway view of the compressor showing details of the inlet valve and unloader mechanism located in right side of cylinder block.



Type E brake valve and treadle type pedal. The body is die cast aluminum and the treadle is a steel stamping with corrugated tread.

Dodge Offers Two V-8 Engines on New Line of Trucks

THE most important news from Dodge Div., Chrysler Corp., incident to the announcement of its 1954 truck line is the adoption of two basic V-8 engines, of overhead valve type with hemisperical combustion chambers, available in three power ranges. Altogether Dodge offers seven basic powerplants—the two V-8's, and five L-head sixes, the latter being available in a range of nine different power ratings. The spread of horsepower ratings in the 1954 line runs from 100 to 172 bhp.



Both stake and platform bodies in the new C-1 Series of Dodge trucks are built in 7½-, 9-, 12- and 14-ft lengths with 78- and 82-in. widths and 30- and 40-in. heights. New low design of C-1 Series gives even lower loading height than formerly.

1954 DODGE TRUCK V-8 ENGINES

90 deg V-8, OHV, with hemispherical combustion chambers

Bore (in.)	3 7/16	3 13/16	3 13/16
Stroke (in.)	3¼	3⅝	3⅝
Displacement (cu in.)	241.4	331	331
Compression ratio	7.5 to 1	7.8 to 1	7.10 to 1
Bhp (gross)	133 @ 3800	153 @ 3600	172 @ 4000
Torque (lb ft) gross	220 @ 2000	268 @ 1600	294 @ 1800
Used on models	H,HA,HL, HAL J,JL,JA,JAL K,KA,KL,KAL G,GA	R,RA,RL, RAL,RS8	T,TA,TL, TAL V,VA,VL, VAL

It is of interest that the 1954 C-1 line of trucks cuts across a major portion of over-the-road hauling requirements with a variety of vehicles ranging in GVW from 4250 to 40,000 lb; and GCW ratings up to 60,000 lb. In addition, Dodge offers four school bus chassis, rated—1½, 2, 2½, and 2¾ tons, the largest model—RS8—being fitted with a 153-hp V-8 as standard equipment.

In summary, the 1954 Dodge truck line includes the following range of vehicles: Conventional models from ½-ton to 4-ton; COE's ranging from 2 to 2½-ton; 4-ton six-wheelers; two Route Vans; Power Wagon; 1-ton and 1½-ton forward control models; and four school bus chassis.

Among the many new features of the line are: more compact tractor models which permit larger payloads, an improved steering linkage, availability of power steering on 4-ton models, wider front tread to increase maneuverability, new frames,

Town Panel in the new C-1 Series. Over-all height has been reduced 3 in., the floor has been lengthened and widened, glass areas increased, and loading heights lowered.

increased driver comfort and visibility, lower loading height, better road stability, and a fresh conception of styling for heavy duty vehicles.

The more compact tractors permit the use of longer trailers within the limitations of overall length. Conventional tractors, except 4-ton, are only 102 in. from front bumper to back of cab, permitting use of 35-ft trailers within the 45-ft legal overall length limit. COE's, on the other hand, have been further compacted to a length of but 81 in.

Frames are wider and curve in at the front to create a recess for the steering gear, thus increasing clearance between front wheels and the frame. Dodge offers a 39-deg turning angle right or left on most models.

All models, except PW, now have the steering linkage ahead of the axle, designed to insulate the steering column and wheel from road shocks with the aid of rear shackling of front springs.

The new half-ton Town Panel has a 100-hp engine, 1475-lb payload capacity, cargo space of 155 cu ft behind the driver, and is sealed against moisture and dust.

Pick-up and express models are offered in ½, ¾,

(*Turn to page* 100, *please*)

1954 DODGE TRUCK, 6 CYL. L-HEAD ENGINES

Bore (in.)	3 1/4	3 1/4	3 1/4	3 7/16	3 7/16	3 7/16	3 7/16	3 7/16	4 1/16
Stroke (in.)	4 1/8	4 1/8	4 5/8	4 1/2	4 1/2	4 9/64	4 9/64	4 9/64	5 1/16
Displacement (cu in.)	217.8	230	230	250.6	250.6	265.4	265.4	265.4	343
Compression Ratio	7.1 to 1	7.25 to 1	7.25 to 1	7 to 1	7 to 1	7 to 1	7 to 1	7 to 1	6.8 to 1
Bhp (gross)	100 @ 3600	103 @ 3600	110 @ 3600	112 @ 3600	120 @ 3600	114 @ 3600	123 @ 3600	136 @ 3600	171 @ 3200
Torque (gross) (lb ft)	177 @ 1600	191 @ 1200	194 @ 1600	205 @ 1600	210 @ 1200	216 @ 1200	225 @ 1200	228 @ 1600	343 @ 1500
								(Twin carburetion)[1]	
Used on Models	B and C	PW,DU, EU	F,D,FS6	HM,HML, HMA, HMAL	G,GA, HS6,H, HL,HA, HAL	JM,JML, JMA, JMAL, KMA, KMAL	J,JL,JA, JAL,JS6, K,KL,KA, KAL	K,KL,KA, KAL	Y,YA,YL, YAL,YX, YXL
							H,HA Extra (Equipt.)		

[1]—Twin carburetion on 136-hp engine is a mandatory extra on "K" models; available as extra equipment on "J" models.

Canada's Booming Motor Vehicle Industry

By James Montagnes

ALMOST 36 per cent more new motor vehicles were available to Canadians in the first half of 1953 than in the same period in 1952. To keep pace with the increasing demand for new cars, the automobile industry is expanding at rapid rate and new factories are being built in southern Ontario.

Canada's official Dominion Bureau of Statistics points out that in the first six months of 1953 there were 286,150 new cars and trucks available, an increase of 75,635 over the same period in 1952. Sales during the first six months totaled 274,039 new cars and trucks, as compared to 212,566 in the January-June, 1952, period. In 1952, Canadians bought 400,777 new passenger cars valued at $1,002,615,841, a new high in volume and dollar value.

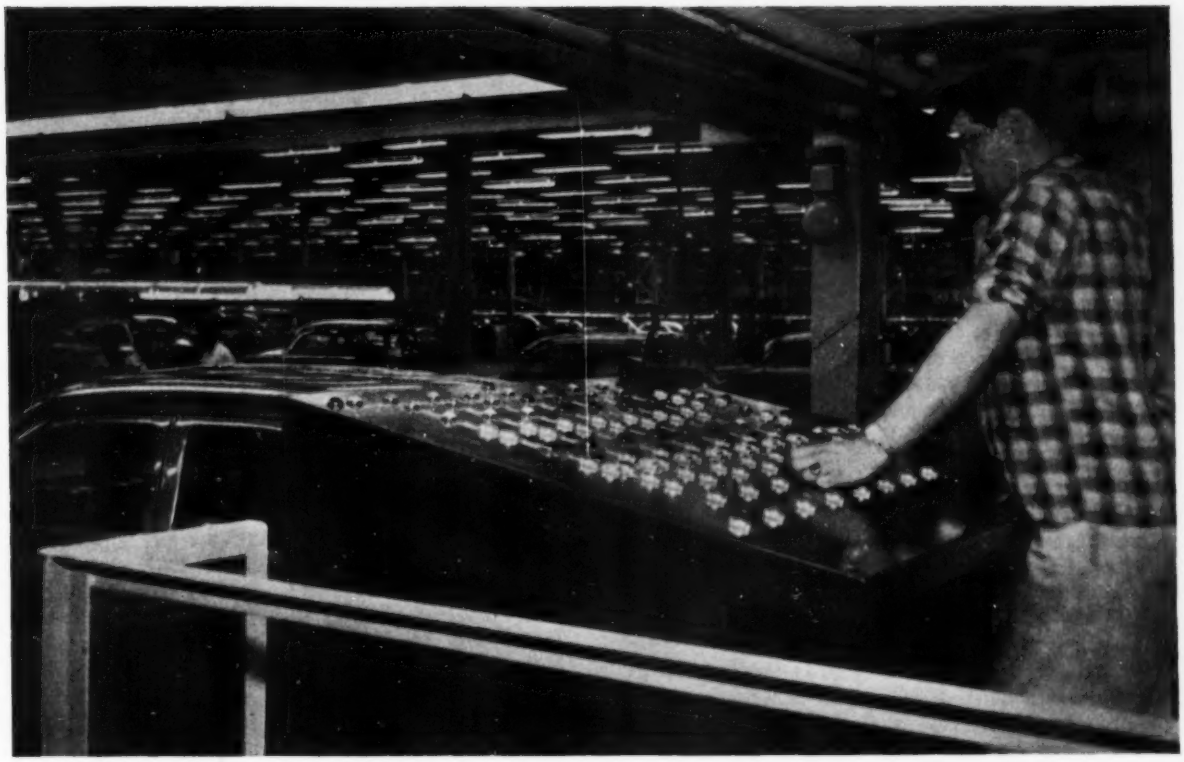
The record sales of new cars since the end of World War II have forced the major automobile companies and the suppliers of parts and equipment to build new plants to keep up with the demand. In mid-May, 1953, Ford Motor of Canada opened for operation the largest factory under one roof outside the United States, at Oakville, a suburb of Toronto (see AUTOMOTIVE INDUSTRIES, November 1, 1952). The new factory covers 32 acres under one roof, and when completed with all machinery will have cost upwards of $35,000,000. At the same time Ford began renovations at its Windsor plants, opposite Detroit, where the company is to make engines, as the assembly of Ford, Monarch, Mercury and Meteor cars and Ford trucks is taken over to the Oakville plant.

LOCATION OF AUTOMOTIVE FACTORIES IN CANADA

Montreal	White Motor Co. of Canada Leyland Motors (Canada) Ltd.
Oshawa, Ont.	General Motors of Canada Ltd.
Toronto, Ont.	Nash Motors of Canada Ltd. Reo Motor Co. of Canada Ltd.
Oakville, Ont.	Ford Motor Co. of Canada Ltd.
Burlington, Ont.	Future plant of Studebaker Corp. of Canada
Hamilton, Ont.	Studebaker Corp. of Canada International Harvester Co. of Canada Ltd.
Ft. Erie, Ont.	Twin Coach Co. of Canada Ltd.
Brantford, Ont.	Fitzjohn Coach Co. of Canada Ltd.
Tilbury, Ont.	Hudson Motors of Canada Ltd.
Windsor, Ont.	Ford Motor Co. of Canada Ltd. Chrysler Corp. of Canada Ltd.
Ft. William, Ont.	Canadian Car & Foundry Co. Ltd.
Winnipeg, Man.	Motor Coach Industries Ltd. Western Flyer Coach Ltd.
Vancouver, B. C.	Hayes Manufacturing Co. Ltd.

General Motors of Canada at its main plant at Oshawa, about 30 miles east of Toronto, has started on a $30,000,000 expansion of an assembly plant to cover 42 acres. This will bring the Oshawa plant to 115 acres, for the production of Chevrolet, Pontiac, Oldsmobile, and Buick cars, and trucks. The plant is to be ready by late 1954. Last year at Oshawa, General Motors produced 45 per cent of all Canadian cars and trucks, 200,310 vehicles in all

At Windsor the Chrysler Corp. of Canada has started on a $17,000,000 expansion which will more than double passenger car output to 512 cars a day. The plant



Control board for the painted body storage department at Ford of Canada's assembly plant in Oakville.

when finished will have over one million sq ft of floor space to manufacture Chrysler, De Soto, Dodge and Plymouth cars. When Chrysler began operations in 1925 at Windsor, the plant was built on a site of seven acres. When the present expansion is completed Chrysler will occupy 170 acres.

Studebaker Corp. of Canada has since shortly after the end of World War II been assembling cars at a former war plant at Hamilton, Ontario. Late in 1952 the company bought 191 acres near Burlington, closer to Oakville and Toronto. Here a new factory is to be built in the near future.

These are the major expansion moves among manufacturers. Similarly parts makers, tire manufacturers, and other suppliers are enlarging their factories for the added demand of the car manufacturers. Official government figures for 1951, latest year available, show that there were 161 manufacturers supplying the automotive industries, producing products with a selling value of $263,113,094. Of the 161 plants, 94 were located in southern Ontario where the automotive plants are located, and these produced the bulk of the parts and equipment, with sales value of $255,216,657.

Canada's automobile industry will be 50 years old in 1954. In 1904 the various plants in Canada produced a total of 117 cars. Prior to that year all cars had been imported. Last year the Canadian automobile industry produced 117 cars an hour. There were at the end of 1952 a total of 3,155,997 passenger cars, trucks, buses and motorcycles registered in Canada, up from 2,872,420 at end of 1951, according to official government figures.

Most cars on Canadian roads are the products of

REGISTRATIONS OF MOTOR VEHICLES IN CANADA BY TYPES, 1929-1952

Year	Passenger Cars	Motor Trucks	Motor Buses	Motor Cycles	Other Motor Vehicles*	Total
1940	1,234,637	247,634	3,182	13,379	1,997	1,500,829
1941	1,279,536	270,941	3,441	14,477	4,389	1,572,784
1942	1,216,950	283,777	4,016	15,818	3,592	1,524,153
1943	1,193,847	294,176	4,302	16,396	3,124	1,511,845
1944	1,177,558	302,611	4,676	15,045	2,677	1,502,567
1945	1,160,058	315,606	5,988	14,194	1,235	1,497,081
1946	1,234,006	355,095	5,788	17,163	10,411	1,622,463
1947	1,370,173	425,803	6,826	26,129	7,028	1,835,959
1948	1,496,384	480,793	7,487	33,939	16,240	2,034,843
1949	1,671,650	535,940	10,078	39,937	33,474	2,291,079
1950	1,930,072	617,194	10,004	43,746	20,251	2,601,267
1951	2,094,646	686,631	12,090	43,166	29,861	2,866,394
1952	2,296,479	770,050	12,021	42,072	36,647	3,157,269

* Includes chiefly road tractors, government and municipal motor vehicles and other miscellaneous types.

Note: Changes in classification of vehicles by several provinces in some years cause fluctuation in the above figures.

Canadian factories. In addition to Ford, General Motors, Chrysler and Studebaker, Nash and Hudson cars; White, International Harvester and Reo trucks are made in Canada. Imported from the United States are higher priced cars such as Cadillac, Lincoln and Packard, and some more expensive models of the Chrysler, Nash and Hudson lines. Henry J. Kaiser and Aero Willys cars are imported, though at some periods some of these were made or assembled in Canada. Nash and Reo plants are at Toronto, White at Montreal, International Harvester at Hamilton, and Hudson at Tilbury, Ont.

There is no exclusively Canadian car in production and no such car has been in production for many years. In addition to the American designed cars made in Canada and imported into Canada, there are a number of British cars for sale in Canada. At various times in recent years a number of British manufacturers have planned to start Canadian assembly plants, but so far only parts depots have been built. British cars made by Ford and General Motors, by Austin Co., Rootes Motors, Standard Motors, and a number of other manufacturers are sold in Canada. Included are the Consul, Zephyr, Vauxhall, Austins, Triumph, Standard, Morris, M-G, Hillman, Rover, Rolls-Royce, Bentley, Jaguar, Humber, Sunbeam-Talbot, and Vanguard. No French or Italian cars are currently sold in Canada, but the German Volkswagen is being sold and there is some plan to assemble the cars in the Toronto area.

Canadian-produced motor vehicles are about 70 per cent Canadian in material and labor content. This percentage is considerably higher than in prewar years, and was brought about during the immediate postwar years when there was a shortage of United States dollars. The Canadian government at that time clamped down import restrictions and exchange regulations which required all types of manufacturers to make more components in Canada and endeavor to export a percentage of such components. This brought a number of new automotive parts manufacturers to Canada and on a reciprocal basis had Canadian plants make parts for U. S. parent companies in order that more U. S. dollars would be available for needed imports in the automotive industries.

The 70 per cent Canadian content is about the limit for the Canadian automotive industries, since imports of certain components which are not manufactured, grown or mined in Canada, are required. Contributing very largely to the 30 per cent of the content of the vehicle that is not produced in Canada are the heavy steel frames and the sheet steel stampings which form the bodies of automobiles. The body panels are stamped from steel which is not made by Canadian steel mills in the widths, nor of the types, required for the purpose. The presses and other equipment required would be too expensive to install in Canadian plants, and would send the price of Canadian cars still higher.

As it is, Canadian manufacturers have to sell their cars at about 30 per cent more than do their parent companies in the United States. This is due to customs import taxes on components, plus a 15 per cent excise tax and 10 per cent sales tax on the factory price. Import taxes on motor cars are roughly about 17½ per cent, a figure they have been for many years. It is estimated that the Canadian automobile industry last year collected for the government $138,500,000 in excise and sales taxes on the purchase of cars and trucks in Canada. That was $6,500,000 more than the automobile manufacturers paid in wages and salaries to their 35,000 employees. Taxes have increased sixfold since 1939.

While more Canadian automobiles are now being sold in Canada, the Canadian manufacturers have seen a sizable drop in their percentage of exports. In 1939 exports of Canadian cars and trucks accounted for about 36 per cent of the production of 155,500 cars and trucks. In 1949 exports accounted for only nine per cent of the 292,500 motor

NUMBER AND VALUE OF MOTOR VEHICLES IMPORTED 1949-1952

		1949	1950	1951	1952
Passenger Cars	No.	35,293	81,722	42,631	34,665
	$	37,470,115	74,961,980	55,668,713	47,135,872
Motor Trucks	No.	3,270	6,770	5,642	4,087
	$	5,179,164	10,587,697	13,991,589	11,742,706
Motor Buses and Coaches (includes electric trackless trolley buses and parts)	No.	134	36	61	241
	$	1,500,368	368,002	963,771	2,347,769
Total Motor Vehicles	No.	38,697	88,528	48,334	38,593
	$	44,149,647	85,917,289	70,624,073	61,226,347
Motor Vehicle Parts	$	120,088,426	162,298,062	199,580,576	194,792,543

NUMBER AND VALUE OF MOTOR VEHICLES EXPORTED 1949-1952

		1949	1950	1951	1952
Passenger Cars	No.	17,489	24,085	37,181	41,666
	$	15,807,688	19,364,912	38,490,266	43,634,467
Motor Trucks	No.	12,147	10,249	23,308	38,268
	$	12,167,742	8,827,198	24,872,620	48,831,551
Total Motor Vehicles	No.	29,616	34,334	60,489	79,934
	$	28,055,430	28,192,110	63,362,886	92,466,018
Motor Vehicle Parts	$	10,752,295	12,036,038	15,763,431	18,548,647

vehicles produced; in 1950 only 8½ per cent of the 390,000 vehicles; in 1951 about 13 per cent of the 415,400 cars and trucks produced; and in 1952 about 18.4 per cent of the 433,710 cars and trucks produced.

Canadian automobile makers are perturbed over this situation, because the industry has depended upon exports in the past as a backlog which enabled a leveling-out of production and minimized the effects of seasonal dips in domestic demand. The export business also made it possible to spread tooling costs over a larger output of vehicles, with the end effect of lower prices. Bulk of Canadian car exports used to be to other parts of the British Commonwealth. This was a major reason for the establishment of some automotive factories in Canada, since the Canadian factories would have the advantage of British Commonwealth preferential tariffs. The lack of dollars in many of these countries, and the subsequent growth of British car exports to sterling currency countries, has resulted in the drop of Canadian car exports.

In 1951 a total of 25,759 passenger cars and 11,994 trucks were exported to British Commonwealth countries, principally to Austrialia, South Africa, New Zealand and British Malaya. The same year Canadian manufacturers sold 11,422 passenger cars and 11,314 trucks to all other countries, primarily to Brazil, Belgium, Mexico and Venezuela.

In addition to the major car and truck producers, there are a number of coach and bus manufacturers in Canada, mostly as licensees of American-designed vehicles. These include Canadian Car and Foundry Ltd., at Fort William, Ont., making Brill buses; Leyland Motors (Canada) Ltd., Montreal,, making British Diesel trucks; Fitzjohn Coach Co. of Canada, Brantford, Ont.; Twin Coach Co., Fort Erie, Ont.; Motor Coach Industries and Western Flyer Coach Ltd., at Winnipeg; and Hayes Manufacturing Co. Ltd., at Vancouver. There are also a number of transport trailer manufacturers in Canada, some as subsidiaries of United States companies. There were a total of 12,021 motor buses registered in Canada in 1952.

Canadian automobile factories have in the past two years been busy with manufacturing military vehicles, mostly trucks and some passenger cars, for the Canadian armed forces, and some for the armed forces of North Atlantic Treaty Organization countries. During World War II practically the entire output of the Canadian factories, from 1940 on, went to the armed forces, and for some years no passenger cars and trucks were built for civilian use.

The motor industry is one of the largest in Canada. Among manufacturing industries, it follows the pulp and paper industry as an employer of people and total wages and salaries paid. In 1952 total value of its products, including both vehicles and parts, exceeded $717,000,000.

All tables courtesy Canadian Automobile Chamber of Commerce Toronto.

PRODUCTION AND WHOLESALE VALUE 1925-1952

Year	PASSENGER CARS Number	PASSENGER CARS Selling Value at Works	TRUCKS & BUSES Number	TRUCKS & BUSES Selling Value at Works	TOTAL Number	TOTAL Selling Value at Works
		$		$		$
1925	1,868	1,638,118	130,777	167,103,012	132,645	168,741,130
1939	91,871	82,847,330	79,657	81,204,338	171,528	164,051,668
1947	167,257	182,161,183	90,758	116,357,486	258,015	298,518,669
1948	166,819	210,799,512	96,941	137,228,722	263,760	348,028,234
1949	193,556	277,660,998	99,028	146,697,354	292,584	424,358,352
1950	284,076	447,029,182	106,026	163,942,858	390,102	610,972,040
1951	282,714	438,613,532	132,706	212,806,695	415,420	651,420,227
1952	283,534	417,654,448	150,176	253,247,296	433,710	670,901,744

Production figures include all wheeled vehicles for military use; universal carriers and scout cars are not included.

Selling value represents the wholesale value or the amount of money received by the manufacturers from their dealers or distributors; taxes, dealers' commissions, etc., are not included.

RATIO OF EXPORTS TO PRODUCTION PASSENGER CARS 1939-1952

Year	Production in Canada	Exports from Canada	% of Exports to Production
1939	108,369	38,548	35.6
1940	109,911	18,145	16.5
1941	96,603	12,315	12.7
1942	12,236	5,283	43.2
1943	.....	172	....
1944	.....	62	....
1945	1,868	44	2.4
1946	91,871	23,451	25.5
1947	167,257	41,550	24.8
1948	166,819	27,277	16.4
1949	193,556	17,469	9.0
1950	284,076	24,065	8.4
1951	282,714	37,181	13.1
1952	283,534	41,666	14.7

RATIO OF EXPORTS TO PRODUCTION COMMERCIAL VEHICLES* 1939-1952

Year	Production in Canada	Exports from Canada	% of Exports to Production
1939	47,057	19,970	42.4
1940	113,102	66,047	58.4
1941	173,588	130,304	75.1
1942	216,057	159,377	73.8
1943	178,064	165,910	93.2
1944	158,038	144,151	91.2
1945	130,777	122,768	93.9
1946	79,657	44,660	56.1
1947	90,758	42,225	46.5
1948	96,941	20,901	21.6
1949	99,028	12,147	12.3
1950	106,026	10,249	9.6
1951	132,706	23,308	17.5
1952	150,176	38,268	25.5

* Includes military vehicles.

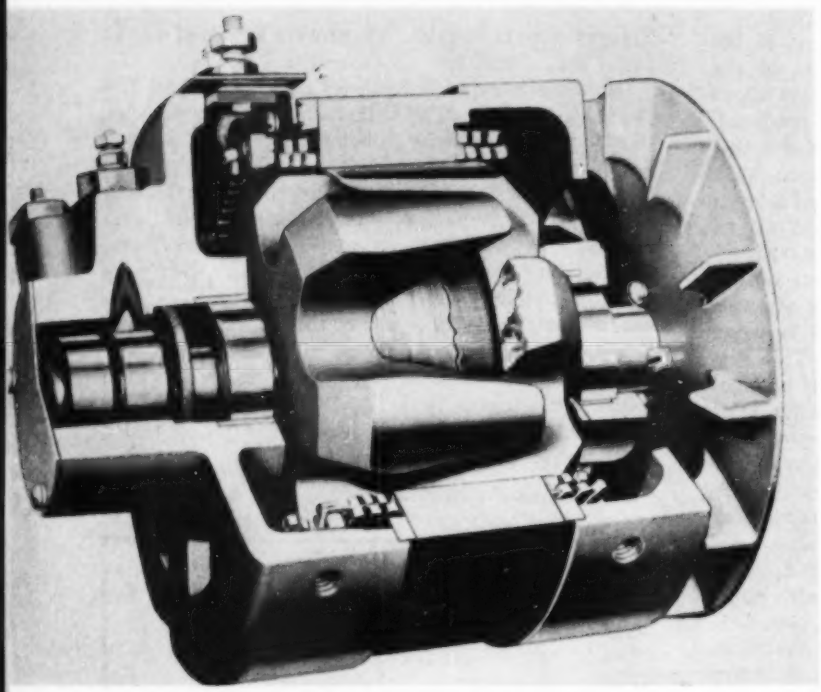


Fig. 1—Fourteen-volt, 60 ampere alternator.

Why Alternator Systems?

By Albert D. Gilchrist, Assistant Vice President
The Leece-Neville Co., Cleveland, Ohio

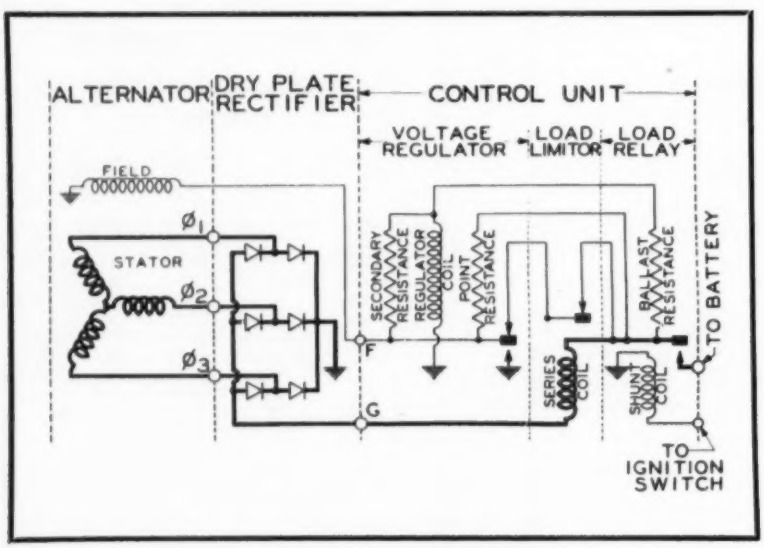


Fig. 2—Ac-dc system wiring diagram.

IT will be interesting to compare a 14 volt, 50 amp d-c truck generator against a 14 volt, 60 amp rectified alternating current system. The design of a wide speed range, high output d-c generator is always a compromise between mechanical limitations and electrical performance. Mechanical limitations arise during high speed operation in securing the windings of the armature, design of the commutator, and selection of the bearings. Cooling presents a problem at full load under slow speed operation. Our 50 amp generator will operate with an efficiency of 65 to 70 per cent with all the losses within the machine which makes the cooling problem difficult and very important. Commutation is the main electrical limiting characteristic particularly at top speed. The commutating performance of a d-c generator is influenced by the operating speed, the load current, the number of poles, the number of commutator bars and the square of the turns per armature coil. Thus a wide speed range, high number of turns per armature coil design for low speed performance is seriously limited to short brush life under full load high speed operation.

The alternator system is composed of three functional parts —the alternator, the bridge type selenium rectifier and the voltage control unit. The alternator is a 6⅝ in. diameter 9 25/32 in. long, 12 pole wye connected machine. Figure 1 is a cutaway view of the alternator showing the rotor consisting of two six-legged iron forgings, an iron core, coil, slip rings, and bearings. The ac-dc system circuit is shown in Fig. 2.

Assume the engine will operate from 500 rpm idle to 3200 rpm. The belt ratio of 1½ to 1 for the d-c unit is the highest we can use for this drives the generator at 4800 rpm when the engine is running at top speed. Under the same condition the

alternator is turning at 7200 rpm using 2.75 to 1 belt ratio which is well below the maximum speed of this unit. Higher ratios could be used to drive the alternator and obtain more output at idle but would require special pulley sizes, not commonly found on automotive engines. It is interesting to note that at the 500 rpm idle speed, the alternator delivers 30 amp to the load while there is nothing available from the d-c generating system. Full load from the ac-dc equipment occurs at 580 engine rpm and for the d-c unit at 1270 rpm.

Let's define our problem as a truck that may be operated over a 10-hr cycle under its heaviest load condition in first, intercity service and then second, heavy traffic of a big metropolis. Operational studies on trucks and buses have shown idle performance to vary from 20 per cent for driving in the country to 60 per cent when driving in a large city. For example, New York City has a bus route that experiences 70 per cent idle time during each round trip.

Load estimations give 35 amp and 306 amp-hr continuous load, and only 10.3 amp-hr intermittent load. Comparing the 35 amp continuous load to ¾ of the rating for both the d-c generator and the alternator system, we see that they should handle the load on our truck. Table 1 charts the calculations for the d-c generator when operating first in the country and second in a large city. The d-c generator operating in the country on a 10-hr cycle would develop 400 amp-hr of 320. This is more than the 316 amp-hr load requirement. The city operation with its high percentage of idle time reduces the total amp-hr generated to 200 for the d-c generator. This would permit only 120 amp-hr load without discharging the battery. These calculations show that the d-c generator equipped truck in city service would require several cycles of recharging the battery during winter operation. Table 2 shows the calculations of the ac-dc system amp-hr capacity. The intercity maximum load amp-hr calculates to be 430 while the city maximum load amp-hr calculates to be 335, thus both operating condi-

(*Turn to page* 118, *please*)

D.C. GENERATOR AMPERE HOUR CALCULATION
INTERCITY CYCLE

OPERATING SPEEDS	% OPERATION	HOURS OPERATION	AMPERES	AMPERE HOURS
IDLE	20	2	0	0
FULL LOAD	80	8	50	400
TOTAL AMPERE HOURS GENERATED				400
MAXIMUM LOAD AMPERE HOURS				320
CITY CYCLE				
IDLE	60	6	0	0
FULL LOAD	40	4	50	200
TOTAL AMPERE HOURS GENERATED				200
MAXIMUM LOAD AMPERE HOURS				160

TABLE 1

A.C.–D.C. SYSTEM AMPERE HOUR CALCULATION
INTERCITY CYCLE

OPERATING SPEEDS	% OPERATION	HOURS OPERATION	AMPERES	AMPERE HOURS
IDLE	20	2	30	60
FULL LOAD	80	8	60	480
TOTAL AMPERE HOURS GENERATED				540
MAXIMUM LOAD AMPERE HOURS				430
CITY CYCLE				
IDLE	60	6	30	180
FULL LOAD	40	4	60	240
TOTAL AMPERE HOURS GENERATED				420
MAXIMUM LOAD AMPERE HOURS				335

TABLE 2

AMPERE HOUR COMPARISON

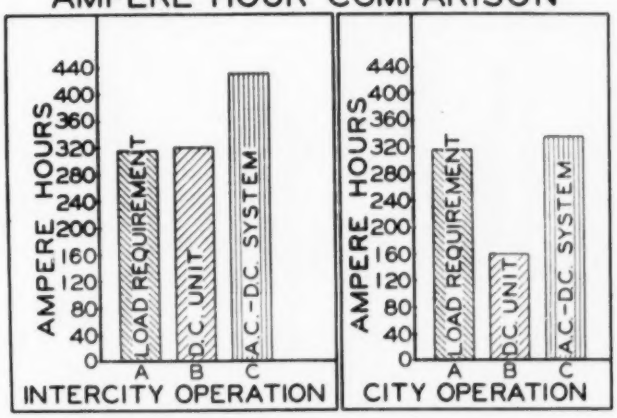
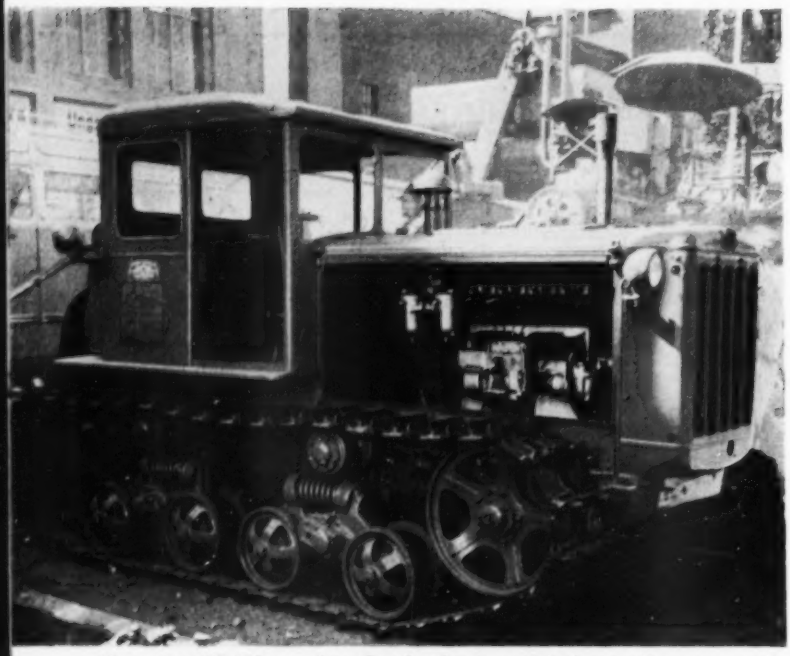


TABLE 3

Communist Vehicles AT THE LEIPZIG FAIR



Hungarian DT-413 crawler. Track, chassis and body are the same as the Soviet DT-54.

Czechoslovak Zetor 25K designed for high ground clearance. The two-cyl Diesel has a piston displacement of 127 cu in.

Rear quarter of the Russian KT-12 logging tractor. The gas generator burns wood. During loading the apron is lowered to the position of a ramp with the built-in winch dragging logs onto it. When logs are secured to the apron by chains, it is drawn to normal carrying position by the winch.

LEIPZIG (SOVIET ZONE)

VEHICLES, tractors and internal combustion engines from the Communist countries were once again featured prominently at the Leipzig Fair in Eastern Germany which was held early in September. While Russia was showing no new models, it was possible, on this occasion, to obtain some further technical details of tractors in current production.

The small 12 bhp XTZ-7, one of the newest Soviet wheeled tractors, features a high rear axle for row crop work or operation on rough terrain. This is effected by a supplementary gear reduction unit on each drive wheel which raises the axle height some 12 in. Front axle height as well as width is adjustable by means of reversible steering knuckles which may be repositioned on their brackets. Overall tractor height and ground clearance may thus be varied to suit orchard or garden work.

Two versions of the larger wheeled Russian tractor were shown at Leipzig, the wide tread MTZ-2, and the MTZ-1 with narrow gauge front wheels. Its four-cyl Diesel which puts out 37 bhp at 1400 rpm is used also in the KD-35 crawler. A modification of this, the KDP-35 intended for row crop cultivation, was also exhibited. This is distinguished by a narrow track width of only eight in. and a high ground clearance of 25½ in.

The DT-54, a medium track-layer, weighs 11,900 lb and has five forward gears and one reverse. Maximum speed in top gear is stated to be 4.8 mph, and drawbar pull in 2nd gear 6300 lb. Power unit is a four-cyl Diesel rated at 54 bhp at 1300 rpm. With five in. bore and six in. stroke, piston displacement is 455 cu in. This tractor is also fitted with special tracks some four ft wide and with deep lugs for forming briquettes on the surface of peat bogs.

The gas-generator logging tractor KT-12 is powered with the standard ZIS engine used in a number of trucks and buses made at the Stalin Auto Works in Moscow. This six-cyl unit of 340 cu in. is given the low rating of 45 bhp at 2300 rpm in this wood-burning application. The transmission includes five forward speeds and one reverse. Weight is nearly 13,000 lb, overall length is 15 ft, maximum width six ft five in., and height of the vehicle is eight ft.

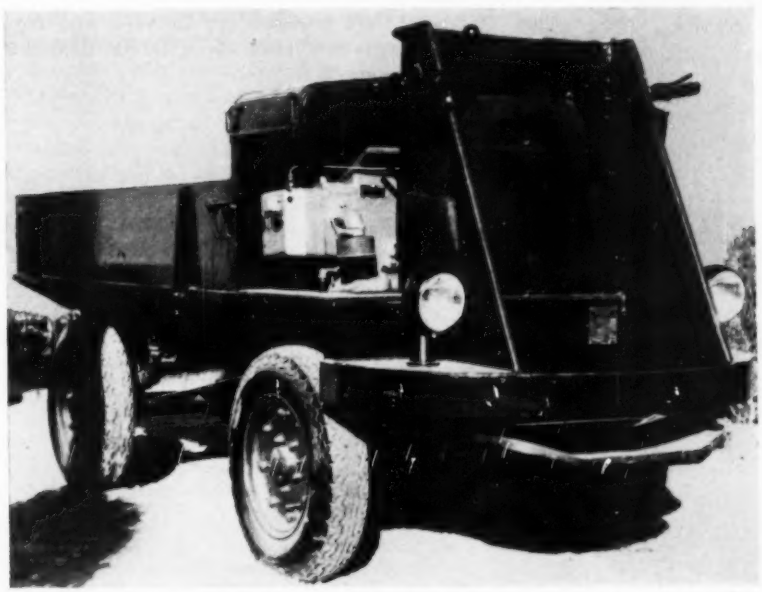
By David Scott

While in its S-80 crawler the USSR has made a remarkably close replica of the Caterpillar D-7, there were several examples of vehicles at Leipzig showing that the other Communist countries are now reproducing Soviet designs. One of these was the Hungarian DT-413 tractor, whose track, chassis and body appeared to be exact copies of the Russian DT-54. Only the engine is different, this being a four-cyl ohv Diesel of 325 cu in. piston displacement having 4.4 in. bore and 5.6 in. stroke.

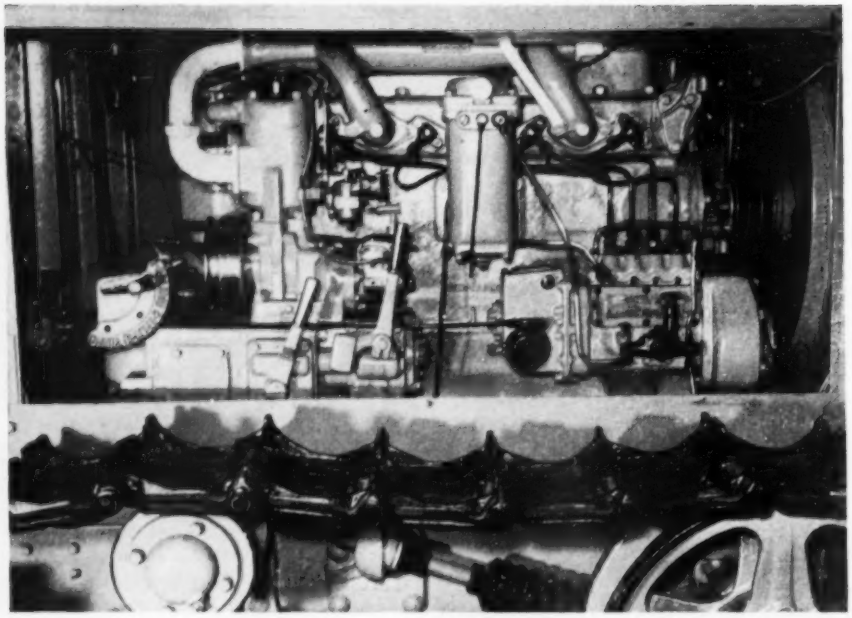
The same engine was found in the Hungarian Ikarus-30 passenger bus which was also exhibited. In this case the power developed is stated to be a maximum of 85 bhp at 2200 rpm. Frame and body of this 31-seater are of integral, frameless construction, with square-section tubular steel frame for rigidity. Electric welding is used throughout. Suspension is by semi-elliptics on all wheels, with double springs at the rear giving progressive action. Working weight is five tons, maximum speed 47 mph, and brakes are hydraulic with air-pressure servo. The engine is centrally located in the front with the driver's forward control position at its left. Transmission includes a single plate dry clutch, five-speed gear box, and spiral-bevel rear end with differential lock.

Two other Hungarian vehicles shown at Leipzig were a dumper for construction work and an electric fork lift truck. Powered by a four-cyl Diesel, the dumper has a load capacity of 3½ cu yd. The V-26 electric fork lift has a 4400 lb capacity and maximum fork elevation of 150 in. A 40 volt, 500 amp hr bank of storage batteries supplies the eight hp drive motor and the five hp hoist motor. Fork assembly is telescopic and may be tilted three deg forward and 10 deg backwards by a pair of hydraulic cylinders. Maximum width is 50 in. and minimum turning radius 100 in. *(Continued, next page)*

Hungarian dump truck of 3½ cu yd capacity. Its engine is a four-cyl Diesel.



Diesel-powered industrial truck made in East Germany. The single-cyl engine develops 5.6 hp at 1500 rpm.



A single-cyl, two-stroke, 10-hp gasoline engine, shown at the upper left of the illustration, is used for starting this Soviet DT-54 Diesel which develops 54 hp at 1300 rpm.

Another example of the reproduction of Russian designs is the Polish five-place Warsawa M-20 car, a replica of the Soviet Pobeda. The story is, there was no vehicle industry in Poland before the war, and that in 1951 the assembly of this car, as well as of a 2½-ton truck, was initially started from parts imported from Russia. Since then machine lines for the local production of components have been introduced in the Warsaw and Lublin factories.

The M-20 has a four-cyl gasoline engine rated at 50 bhp at 3600 rpm. Bore and stroke are 3.3 in. by four in. and piston displacement 129 cu in. The automobile is designed for rough roads and hard use, with heavy semi-elliptical springs at the rear and individual coil suspension in front.

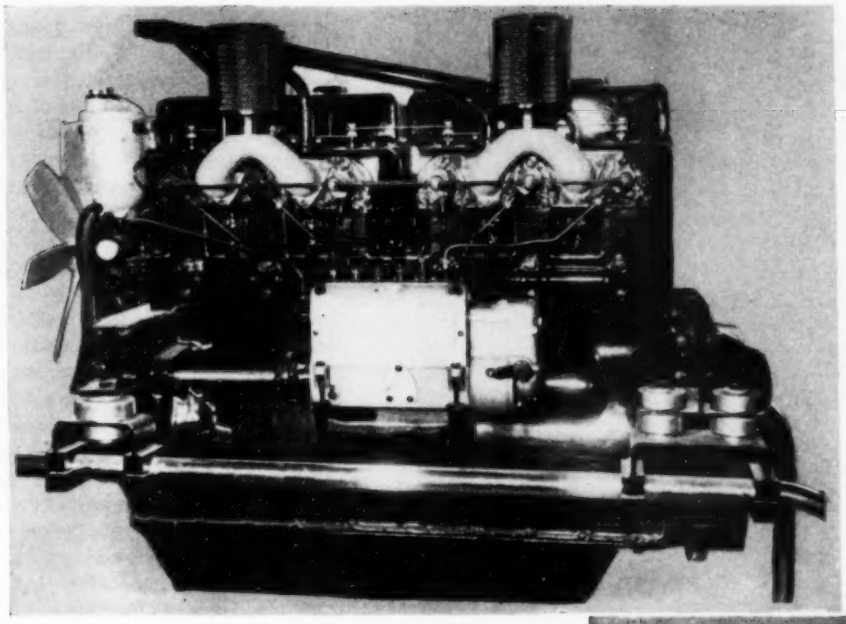
An earlier Polish truck, the Star 20, was first made in the Starachowice works in 1948. This 3½-tonner, shown at Leipzig with a drop-sided body, has a six-cyl gasoline engine developing 85 bhp at 2800 rpm. Bore and stroke are 3.7 in. and 4.2 in. with a piston displacement of 255 cu in.

Among the Czechoslovak vehicles exhibited was the 10-ton Tatra 111 which was described in AUTOMOTIVE INDUSTRIES of August 1. This six-by-six is now being exported and a number of them were seen in the streets of Leipzig.

One Czech tractor was the Zetor 25K whose two-cyl Diesel of 127 cu in. is rated at 24 bph at 1600 rpm. The gear box provides six forward and two reverse gears, and maximum speed is listed as 11

East German IFA F9 two-door sedan with broad rear window and enlarged trunk. This model weighs 1900 lb.

Hungarian V-26 electric fork lift which has a capacity of 4400 lb. Maximum elevation of the fork is 150 in.



Model EM6-15 six-cyl Diesel made in the nationalized Horch works in Zwickau, Eastern Germany. Compression ratio is 17.5 to 1 and output is 90 hp at 2000 rpm.

This IFA Pionier tractor from East Germany is powered by a four-cyl Diesel which develops 40 hp at 1250 rpm.

mph with 9.00-36 tires. The Zetor 25, also shown, differs in having smaller (11.25-24) tires and a lower front axle. Its top speed in sixth gear is 19 mph. Both have hydraulic implement control.

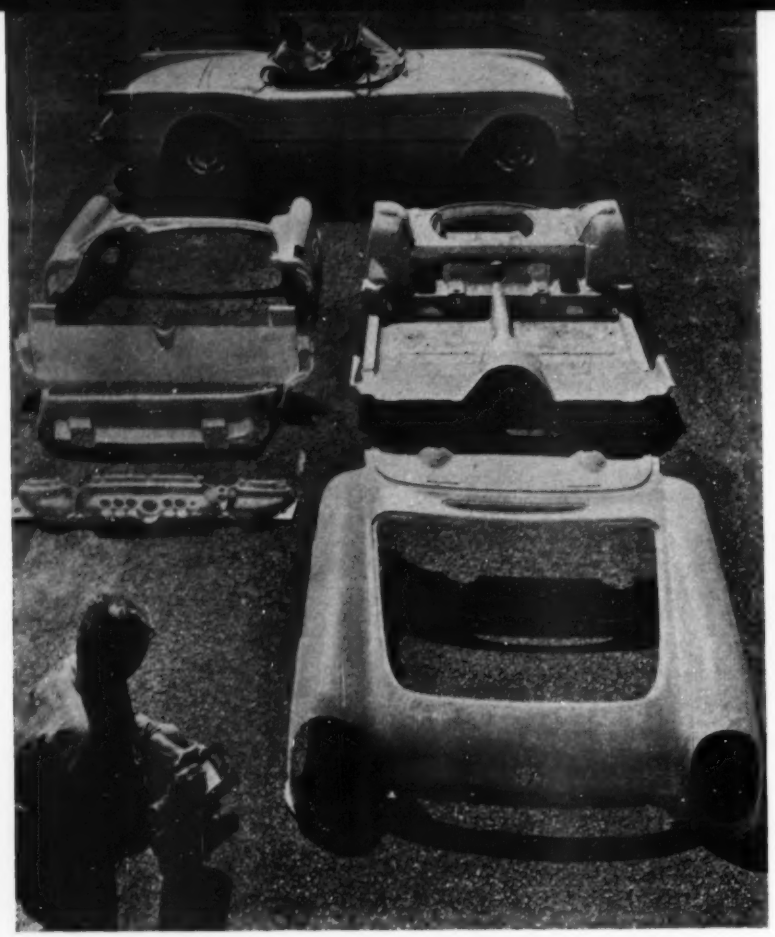
While no vehicles from Communist China were exhibited, there was an array of automotive parts spread out in one section of the Chinese pavilion. These included an alloy cylinder head, carburetor, fuel pump, fiber gears, starter, generator, radiator, axles and drive shafts with differentials, ball and roller bearings, brake linings up to ⅝ in. thick, and a complete gear box. The largest internal combustion engine on display was a stationary six-cyl, four-stroke Diesel with compressed air starting. This was stated to develop 300 bhp at 600 rpm, bore and stroke being 10 in. and 12 in. Several four- and two-stroke Diesel-powered generating sets were exhibited. There was also a Chinese motorcycle of modern design (and apparently East German parentage) and a motor-assisted bicycle which seemed to be an exact replica of a British model.

The East German vehicle exhibition at the Fair was greatly enlarged this year and occupied a newly-constructed crescent-shaped building and extensive outdoor space. The light 30 bhp IFA F9 automobile was shown with some new coachwork, one model being a station wagon seating four and with floor space for a 500 lb load. This is made either with an all-metal body or with wooden side-panels. The F9 two-door sedan has been redesigned to give a broad curved rear window and a larger trunk.

One of the smaller East German tractors was the IFA Pionier with a four-cyl Diesel of 310 cu in. displacement delivering 40 bhp at 1250 rpm. It has compressed air starting and five forward speeds. A Diesel-powered variant of the standing-driver electric truck was also on display. The single-cylinder, four-stroke engine is rated at 5.6 bhp at 1500 rpm. The gear box has four speeds. Load capacity is two tons, and weight and operating cost of this truck are said to be considerably less than that of same-rated electric vehicles.

For heavier commercial vehicles East Germany is now introducing a new series of standardized Diesel engines of unit construction design. They are based on a 90 cu in. 15 bhp cylinder in multiples of two,

(*Turn to page* 80, *please*)



Major components of Corvette reinforced plastic body. Clockwise, above, from "checker" at lower left are: Instrument panel, bulkhead and seat back, rear fender top panel, underbody and front end.

First Production Techniques for

ALTHOUGH only a few years ago it was widely held that plastic autobody construction would not fit mass production requirements, the radical advances in plastics formulations, as well as production techniques, have changed this viewpoint materially. Perhaps the best example of what has been accomplished more recently is that of the Chevrolet Corvette, the dramatically styled sports car, which has been built at the rate of three a day in recent months in a small, self-contained pilot plant at the Chevrolet assembly plant in Flint.

As a result of extensive engineering development and refinements in manufacturing techniques, Corvette production has been pegged at 12,000 units in 1954 at an average rate of 1000 cars per month. When this program is initiated at the start of the year, assembly operations are to be shifted from Flint to the giant Chevrolet assembly plant in St. Louis where ample floor space is available for pro-

◀ *Initial step in the production of the body was the construction of die models for the molds necessary to form plastic sections. This is the mahogany die model for the underbody.*

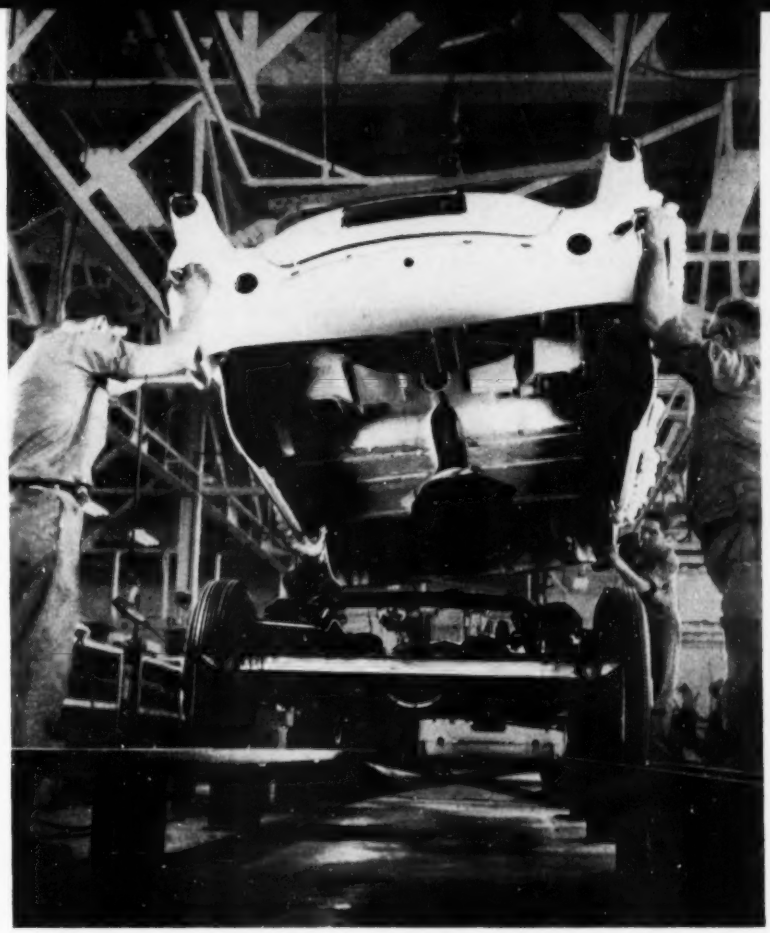
▶ *This underbody drilling fixture is a prime example of improvization at Chevrolet to speed production and reduce tooling cost. The entire frame is made of polyester plastic while the drill jig proper has been adapted from an underbody molding. The fixture is used, as shown, for drilling the various holes required for the attachment of other body sections.*

▶▶ *Workmen assemble the front top section to the underbody, which at this point has been fitted with the instrument panel and the lower portion of the seat back. The underbody, mounted on a dolly, is the basic structure in body assembly.*

ducing these new automobiles.

It is interesting to speculate on the possible growth of plastics in the automobile industry incident to this development, since it is quite likely that requirements may tend to grow in many directions. According to Chevrolet, the Corvette body assembly weighs 411 lb, including perhaps 25 lb of steel parts. Chief ingredients of the glass-plastic formulation are: 60 per cent polyester resins, and 40 per cent glass fibers or mats. If we assume for the sake of rounded figures that the glass-plastic structure takes 400 lb of material, the consumption for Chevrolet alone, on the basis of 12,000 units, will run about 1440 tons of polyester resins, and 960 tons of glass fibers for the year.

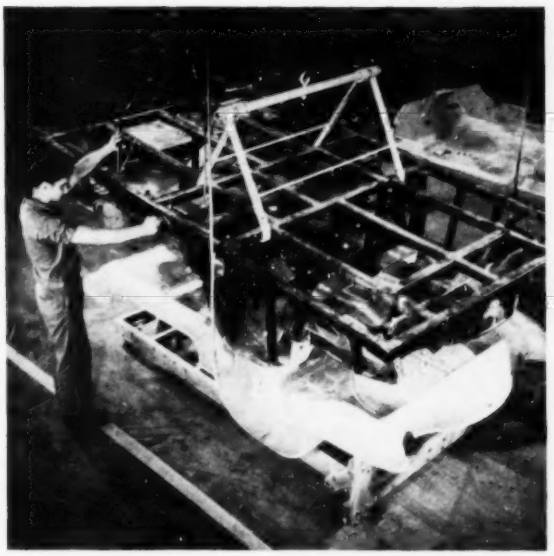
Out of the welter of speculation during the period preceding disclosure of Corvette manufacturing methods, there has emerged some positive information of general interest to our readers. For one thing, Chevrolet has proved that plastic con-

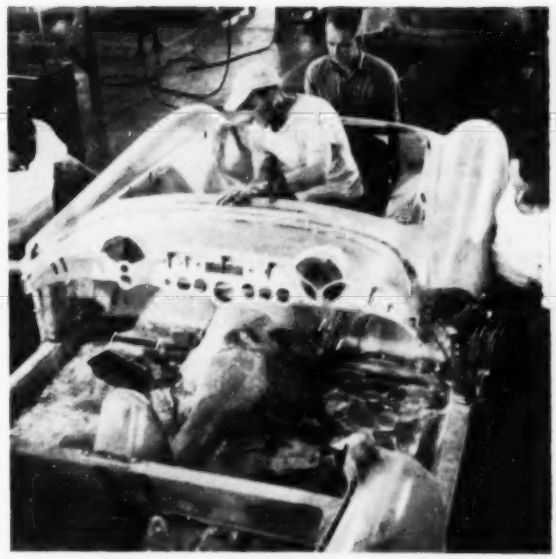


This view on the final assembly line shows the body drop with workmen carefully guiding the body into place.

Corvette Plastic Bodies

By Jose[illegible] Geschelin





struction has some powerful advantages in an experimental program. It is estimated that if initial Corvette production had been projected in conventional steel panel construction, die cost would have run around $4.5 million and the start of production would have been delayed for many additional months. In plastic, the cost of tooling has run around $500,000, a very large saving indeed.

While reinforced plastics are not new today, Chevrolet has had to pioneer in an entirely new field, starting with such hand methods as were known at the outset. Consequently, the initial production operation has been instrumental in giving considerable impetus to the art. By the time the assembly operation is moved to St. Louis many of the smaller molded parts will be made with matched metal dies and eventually all parts, regardless of size, may be produced by this precision method.

Major body seams are both bonded and riveted. After the contact flanges have been joined by a bonding agent, spring-loaded clamps are placed along the flange and rivet holes drilled as shown. Use of the clamps permits the flange to be drilled and riveted and the assembly handled before curing of the bond joint is complete.

Parts molded with matched metal dies can be made precisely to size, within close dimensional tolerances, and produced with a fine smooth finish true to contour. Apart from speeding productivity in the plastics molding plant, this technique will make it easier to fit parts at assembly and will eliminate most of the hand filing and grinding and polishing now necessary. Consequently, this will expedite assembly operations materially and thus will effectuate the projected building of 1000 units per month.

At the present writing the Corvette body assembly is prepared from 61 different parts and assemblies. Backbone of the structure is the enormous — for a molded plastic part — one-piece underbody, extending from the rear end to the front. One of the secrets of relatively low cost manufacturing methods is the improvization of large jigs and fixtures constructed almost entirely of polyester plastics formulations. These are used for preparing upper and front major sub-assemblies, similar construction being employed for the large drill jigs.

Body assembly starts on the massive steel dolly, in a manner similar to steel body assembly. The underbody is securely fastened to the dolly, then follows installation of the upper and front sections, as well as detail parts such as the instrument panel and other sections. At assembly, the major structural elements are both bonded and riveted, using steel rivets and small steel backing plates where plastic-to-metal contacts are subject to stress. This is done along flanges provided for the purpose, later concealed by decorative moldings.

It is of interest that all sections are bonded together with a special plastic cement, applied cold and self-curing at room temperature during the time interval required for completing the assembly. As the various joints set securely, the assembly operators proceed to file and grind and polish to remove all projections and to fair contours properly. As noted earlier, this procedure will be largely reduced, if not eliminated, when most of the parts are produced with matched metal dies.

The instrument panel and cowl structure, which are stressed in this construction, also are joined by a combination of bonding and riveting. The steel parts required in the structure consist of a variety of small brackets, hinges, door locks and strikers, etc. Perhaps the largest steel element attached to the body is the rectangular frame for supporting the radiator.

Another of the misconceptions dispelled with the disclosure of manufacturing details is that of painting the bodies. There have been various reports that the plastic formulation is pigmented, thus making paint application unnecessary. Chevrolet has investigated various methods and has concluded that pigmented plastic is not suitable for autobody finish because it lacks depth and luster. Actually the Corvette body is treated almost the same as is a steel body, except that no rustproofing is required.

(*Turn to page* 102, *please*)

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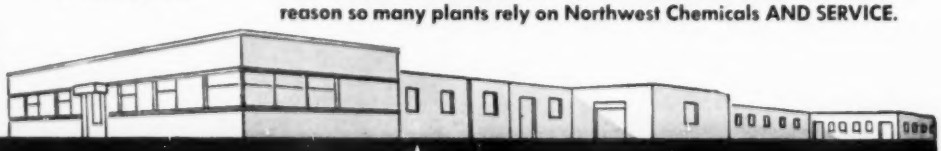

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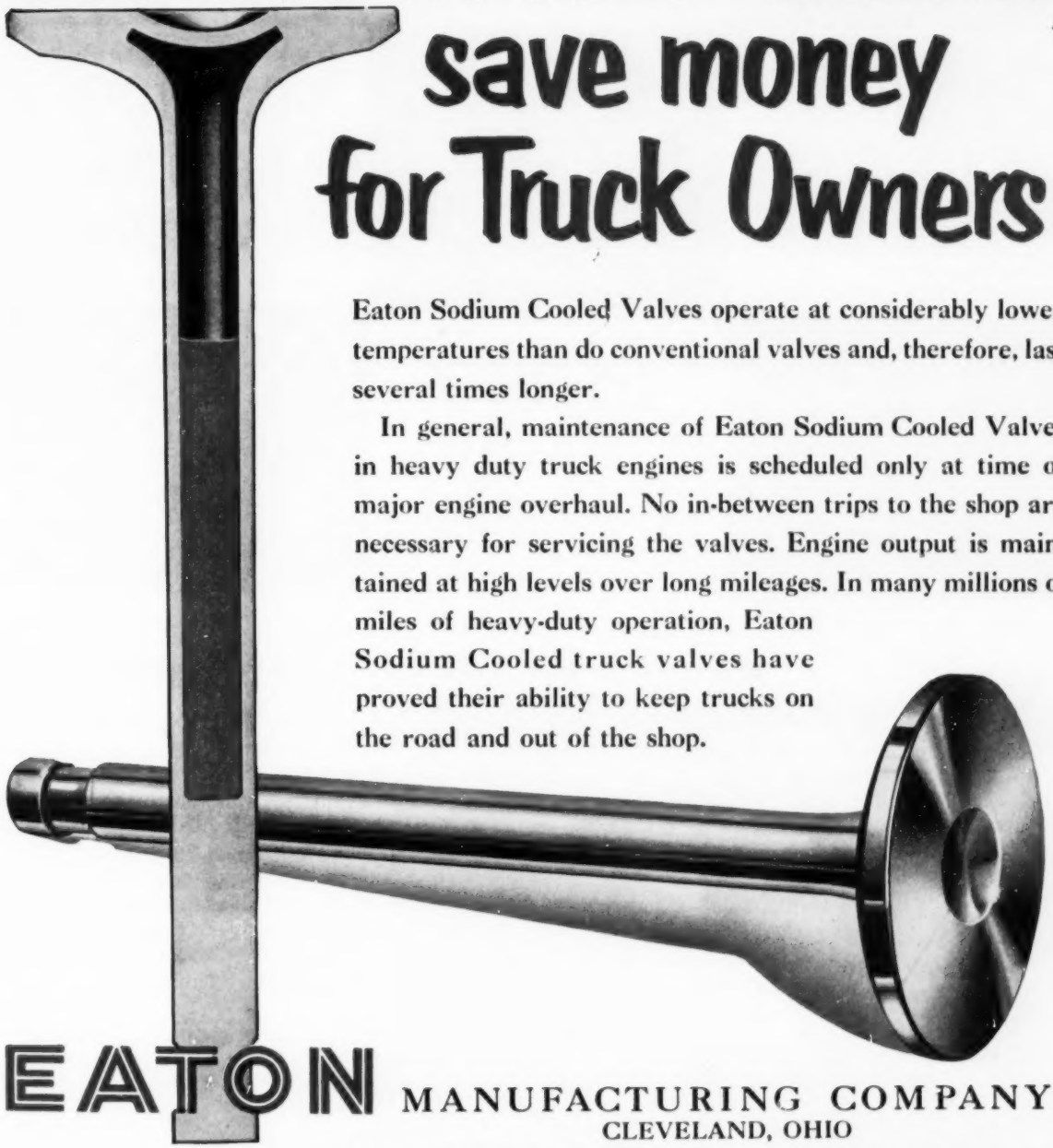

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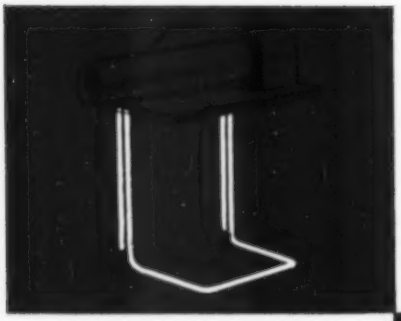

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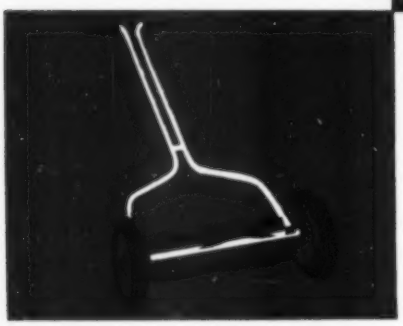

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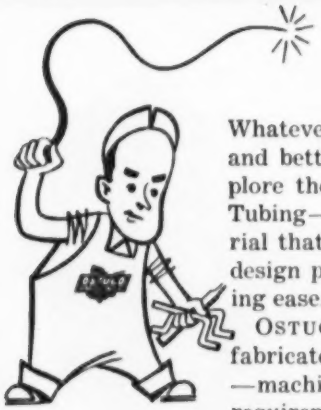

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News of the MACHINERY INDUSTRIES

By Thomas Mac New

Record - Playback Control for Machines May Double Their Output for Some Operations. New Reheat Furnace Handles Work Automatically.

Tape Operates Machines

General Electric Co. is building a record-playback control which will control and direct a machine or process from information recorded on magnetic tape.

To be made for the Giddings and Lewis Machine Tool Co., Fond du Lac, Wis., the automatic control—in development at G.E. for five years—is expected to double the production speed of a milling machine that manufactures integral-rib skin for jet aircraft.

According to G.E., the industrial type, multiple channel tape recorder used in the control is similar to equipment employed in the broadcasting field, except that it provides motion instead of sound.

It is anticipated that a skin milling machine equipped with the control will be ready early next year for demonstration to airframe makers.

To record the necessary motions on the tape, a machinist performs the necessary operations or tracer control is used to run the machine through a series of motions to produce the first piece of work. These motions are translated into electrical signals by means of selsyns and are recorded on the magnetic tape through an electronic circuit. Non-production motions are, of course, not recorded.

Research studies are underway at G&L to probe the possibility of using an electronic computer to convert numerical data into the electrical signals recorded on the tape. This would eliminate the first manual machining operation.

At the present state of development, G.E. engineers stated that playback controls must be custom-built to suit each installation.

As a matter of interest, the playback unit weighs approximately 1900 lb.

Automatic Furnaces

One of the steel mills in the middle west has recently completed the installation of three automatic furnaces for its tube mill. The equipment consists of a plug mill reheat, reducing mill reheat, and an unusually large fully-automatic normalizing furnace. All of the furnaces are designed for either gas or oil operation.

Perhaps the most important feature of the new furnaces, designed and built by Continental Industrial Engineers, Inc., of Chicago, is the automated mechanisms for handling the workpieces.

For example, in the reheat furnace, illustrated below, the tubes roll in over a series of water cooled rolls on one side of the furnace, and are automatically pushed off of the rolls onto an inclined hearth. The tubes then roll down the inclined hearth and are retained there by a series of hydraulically-operated fingers.

As the mill operator requires a tube from the furnace, a button is depressed which automatically rolls the tube out of the furnace and on the processing table.

By limit switches and dynamic braking on the run-in rolls, the tubes are automatically located in a predetermined position. Tubes travel across the furnace hearth by rolling on specially designed ceramic rails.

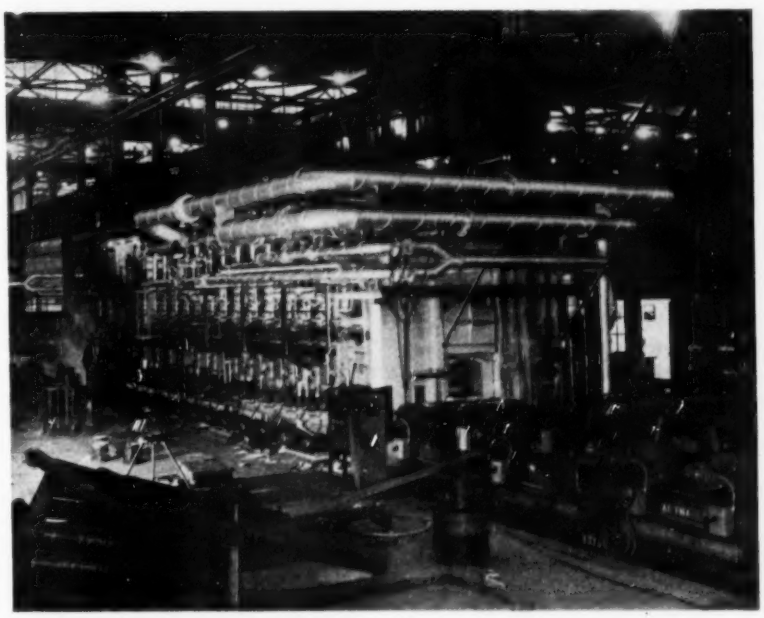
The production rate is 75 tons per hour at 2250 F.

Materials Handling Economics

In Detroit, recently, a group of 200 top management people participated in a working conference on the economics of materials handling. The affair was jointly sponsored by the Material Handling Institute, the Detroit Board of Commerce, and Wayne University.

It was brought out at the meeting that materials handling costs average 35 per cent of the cost of production and may go as high as 90 per cent. Sales of materials handling equipment such as fork trucks, conveyors, etc., ran over $1¼ billion last year, it was stated.

In citing good materials handling



Fully automated reheat furnace designed by Continental.

practices, A. T. Waidelich, vice-president, The Austin Co., Cleveland, Ohio, called attention to Lincoln Electric Company's new plant outside Cleveland. He referred to the plant as "a stock room with a built-in factory." Aisles are not provided for access to the machines, but for stock. In the center of each 60-ft bay, there is an aisle with stock on either side —usually on roller conveyors which carry it toward machines and assembly stations along the longitudinal power conveyors adjacent to each line of columns.

Keep Automation Simple

Otto Svoboda, sales manager, E. W. Buschman Co., Inc., Cincinnati, when addressing the American Society of Mechanical Engineers in Rochester, N. Y., recently, told engineers that one of the most important requirements for automation is to design the simplest combination of mechanisms and controls possible. He also warned against mounting electronic equipment where it may be subjected to excess vibration or severe atmospheric conditions.

According to Mr. Svoboda, much of the progress in automation will come from conveyor engineers who find new ways of automatically moving materials and positioning them for processing.

Around the Industry

The Brad-Foote subsidiary, Pittsburgh Gear Co., will soon move to new quarters on Neville Island outside of Pittsburgh. About $1 million will be invested in the new plant.

At a recent board meeting of Greenlee Bros. & Co., Rockford, Ill., L. H. Geddes was named executive vice-president of the firm. At the same time D. E. Hawkinson was elected vice-president in charge of machine tool sales, and R. J. Samuelson was elected vice-president of Greenlee Tool Co., a subsidiary, in charge of tool sales.

Gisholt Machine Co., Madison, Wis., has announced the appointment of two new district representatives. William E. Johnson will handle the Cleveland area, while Rodney H. Stebbins will work out of Milwaukee.

The Drop Forging Association has produced a motion picture, "Forging in Closed Dies," which covers every phase and operation in the making of closed die forgings.

Kurt Orban Co., Inc., has moved its Cleveland office and service center to larger quarters at 1256 East 12 Street. Over $100,000 of German tools are on display.

The automatic Control and Uni-Flo Division of the Barber-Colman Co., have opened up two new factory branches, one in Indianapolis, Ind., and the other in Omaha, Neb.

Cincinnati Shaper Co. has announced the shipment of the first machine from its new Whitewater Shop.

ON OUR WASHINGTON WIRE

Mobilization officials are reviewing more than 125 expansion programs which are not yet complete. However, no cutback is expected in the program for building modern transport aircraft of the kind which can be quickly converted for hauling military cargoes.

First steps in the Government's use of new stockpile production machinery are pointed out in the latest defense mobilization report to the President. Wherever possible, older machine tools, now owned by the Government, are going to be kept close by the plants which would use them in an emergency. The plan agreed upon by ODM agency and the Defense Dept. is to have plant owners store and maintain these tools wherever possible.

I.C.C. has modified its motor carrier safety regulations covering brake requirements. The modified regulation is in Ex Parte No. MC-40, Part 193, 42(c). The amendment now reads: "Trucks and truck-tractors having three or more axles need not have brakes on the front wheels, except when such vehicles are equipped with at least two steerable axles, the wheels of one such axle need not be equipped with brakes.

From a monetary outlook, stockpiling of strategic materials is about 65 per cent complete. However, out of 76 items currently being stockpiled, inventories for 24 are still 50 per cent or more short of quantity goals.

Commerce Dept. is already well engaged in a study of some 80,000 plants essential for wartime. So far, out of 190 plants given a top-essential rating, at least a half are in probable target areas.

Delivery rate of hard goods, about $2.5 billion a month, is now deemed largely sufficient to meet both civilian and military needs under present mobilization planning. From here on attention is to be centered on working out a "flexible" set of plans for taking care of "new" emergencies.

LEIPZIG FAIR

(*Continued from page* 69)

three, four and six cylinders. At 1500 rpm these develop 30, 45, 60 and 90 bhp respectively. Cylinder block and head castings are for two or three cylinders, while most parts and components are common to all engines.

Cylinder heads are machined on Eastern Germany's first automatic transfer line which is reported to have recently gone into production at the Horch works in Zwickau where these engines are made. The line has 8 stations of two-way multi-spindle drills which combine 110 operations. One head is said to be completed in 3½ min.

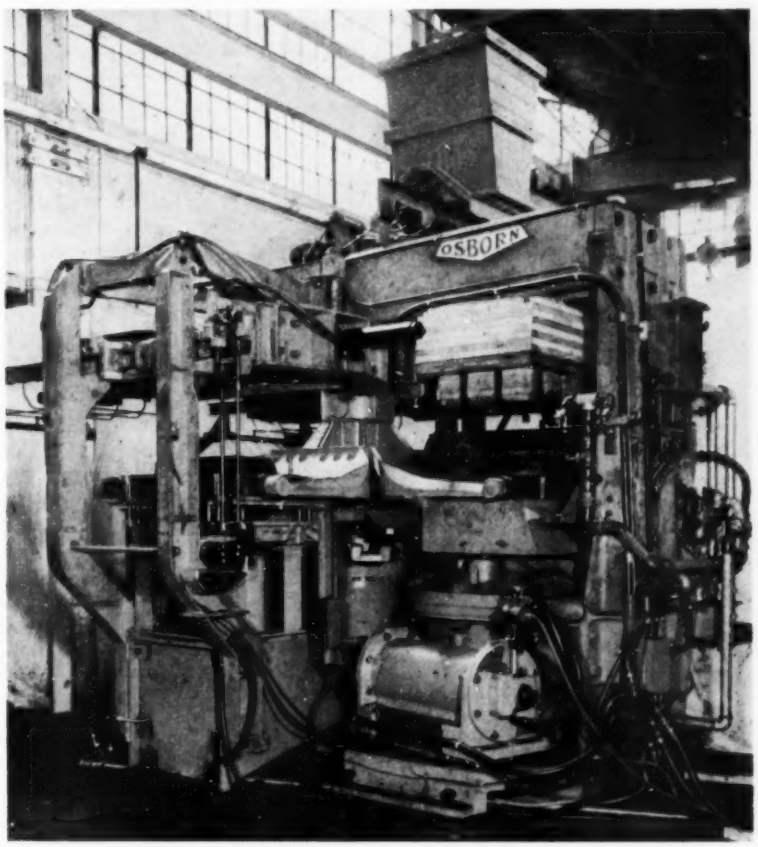
The East German vehicle industry is expected to be strengthened as a result of the "new course" announced by the government on June 9. Although the current Five-Year Plan targets for heavy industry are to be cut back, transport is one of the sectors which will be unaffected. And with increased emphasis on consumer goods, passenger car production is to be stepped up.

At the same time, the agreement with Russia announced on August 25 stipulated that all reparations to the USSR will be cancelled as of the first of next year while a number of machine tool and other plants—operated by the Russians since the war—will be returned to German hands. These measures may increase the productive capacity of the industry while making a greater number of vehicles available for export as well as for home use.

NEW EQUIPMENT PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

Rotary Automatic Molds Cylinder Block Halves



Installation of Osborn Rotary Automatic Molding Unit.

A rotary automatic molding machine has been developed to meet the need for an improved mold production method suitable for making sand molds in which various types of castings are produced. Tests indicate that this 80,000-lb machine will be capable of producing cylinder block half molds at the rate of 240 per hour, and shallower molds at rates up to 300 halves per hour.

The machine has four stations at which the major operations required to make a mold are automatically performed. A half pattern which forms the mold contours is mounted on a platen at each of the four stations. The platens float in the turntable and can be raised at each station to permit the various operations to be performed. At station No. 2, the flask in which the mold is to be rammed is automatically transferred on rollers into position beneath the sand supply hopper and directly over the platen. The platen carrying the pattern is then raised by means of pneumatic pistons until the flask is in position on the pattern. The gate on the sand supply hopper is then opened until the flask is filled with sand. Next, the platen carrying the pattern, flask and sand is returned to position ready for indexing to the next station.

While the above operation is taking place at station No. 2, a flask which has previously been loaded as above is given a predetermined number of jolts and then squeezed at station No. 3 to give the molding sand proper hardness and uniformity. Both jolt and squeeze operations are performed by pneumatic pistons. While a flask is being loaded and filled at station No. 2 and another is being jolted and squeezed at station No. 3, a third flask containing a rammed mold is being drawn from the pattern at station No. 4. The elevating mechanism for accomplishing the draw operation is similar to that used at loading station No. 2. At the finish of the draw operation, the completed mold rests on rollers and is discharged from the machine by means of a pneumatic piston.

The operations at stations No. 2, 3, and 4 are performed simultaneously and are automatically controlled through a drum switch which actuates solenoid valves controlling each of the operations. The turntable which carries the pattern and flask through each station is actuated by an indexing mechanism which uses a modified Geneva motion.

Two of the above machines are used in the production of cylinder blocks—one for making the cope, and the other for the drag. Each of these automatic cylinder block molding machines consumes approximately 120,000 lb of sand each hour. *Osborn Manufacturing Co.*

Circle 66 on page 89 for more data

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89

Smaller Redesigned Motors Have Higher Ratings

A line of polyphase a-c motors, offering better protection, more efficiency, and quieter operation has been announced. Called Tri-Clad "55," the motors are built to latest standard NEMA frame dimensions.

With an average size reduction of 50 per cent by volume and averaging 22 per cent less weight per horsepower, the "55" retains rigid cast-iron construction and incorporates a new insulation system, bearing assembly, and ventilation plan.

The insulation system is a new polyester film which is said to be eight times as strong as previously used materials. It is used to insulate the phases and slot tubes in the stator. This synthetic material is combined with Formex wire, an improved Glyptal varnish, and a silicon Drifilm dip.

The new bearing assembly is more tightly sealed and is lubricated by a grease which lasts at least five times longer than formerly used lubricants. A double-end ventilation system uniformly cools the motor by drawing air in from beneath both endshields, through baffled air passages, and out louvers on the sides of the frame. Larger integrally-cast rotor fans increase the cooling air flow through the motor and dissipate rotor heat more effectively. Protection has been increased on the drip-proof enclosure through new end-shield and frame design.

Noise level of the new 10-hp motor motor tests as low as the former two-hp model. All new Tri-Clad motors must now pass a quality control sound test before leaving the factory.

The totally-enclosed fan-cooled motor also has been redesigned. Electrical parts are completely enclosed by tightly sealed cast-iron frame and end-shields, a compression-fit lead seal, and a rotating labyrinth seal on the shaft. A new "jet" ventilation system blankets the frame with cooling air. Exposed parts are corrosion-resistant.

Other improved maintenance features include permanently-numbered, non-wicking connection leads, a larger diagonally-split conduit box, and knock-off lugs on the end-shields.

The Tri-Clad "55" has a higher full-load speed rating and greater efficiency than the former motor.

After the first of the year, the new motors will be available in the 182 and 184 frame sizes (1, 1½, and 2 hp at 1800 rpm) in horizontal drip-proof and totally-enclosed fan-cooled models, and a complete line of gear-motors. Larger frame sizes will become available at regular intervals. Other types planned for production during 1954 include vertical, single-phase, wound rotor, explosion-proof, multi-speed, face-mounted, and flange-mounted models. *General Electric Co.*

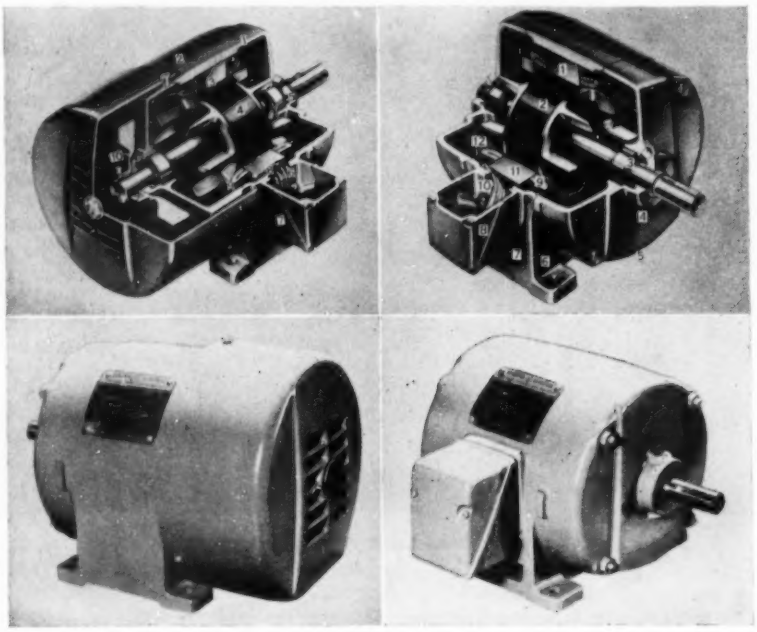
Circle 68 on page 89 for more data

Cut-Off Machine

Now offered is the Model ME-1 automatic cut-off machine which is said to offer a substantial saving of time and labor and reduce operator fatigue to a minimum. The cutting mechanism is totally enclosed in a metal hood for operator protection. Clamps hold the material on both sides of the cut.

The machine can be furnished in five-hp, 1800-rpm models for the cutting of non-ferrous materials and in 10-hp, 3600-rpm models for the ferrous materials. Both models are capable of cutting both round bar stock and extruded shapes as well as plastic and composition materials. *DeWalt, Inc.*

Circle 67 on page 89 for more data



Features of General Electric's Tri-Clad "55" enclosed fan-cooled motor (left) include:

1, moisture-proof sealing compound; 2, completely enclosed by cast-iron; 3, polyester film slot and phase insulation; 4, solid cast rotor windings; 5, labyrinth seal; 6, permanently-numbered leads; 7, easy access conduit box; 8, compression-tight seal; 9, water-shedding stator windings, and 10, split-hub Textolite fan.

Features of the drip-proof motor design (right) include:

1, polyester film slot and phase insulation; 2, solid-cast rotor windings; 3, better sealed bearing system; 4, more fully protected end shields; 5, shaft-end air intake of double-end ventilation system; 6, rigid cast-iron construction; 7, louvered ventilation exhaust; 8, easy access conduit box; 9, securely anchored stator windings; 10, permanently numbered leads; 11, press-fitted stator punchings, and 12, sonance designed ventilation baffle.

Automatic Plating Machine Operates on Low Pressure

This fully automatic vertical transfer return type plating machine is a complete plating unit consisting of all the necessary components for the automatic performance of the operations required in any plating cycle. The unit consists of a base, the various necessary processing tanks, conveying and transfer mechanism, work carriers, necessary anode and cathode bars, hydraulic equipment, and controls. The unit is completely prefabricated to the customers' specifications.

It is said to differ from other plating machines on the market at the present time in that is has no elevating superstructure, no transfer cams, no chains and sprockets, and no hydraulic cylinders above tanks. Only two basic motions were retained to perform all operations—one forward and reverse straight line horizontal motion, and one raising and lowering vertical motion. A reciprocating carriage is located between two rows of tanks, on which all the transfer and conveying mechanism is mounted.

The plating racks are hooked on work carriers at the loading station. The work carriers rest on two rails and are independent of the transfer mechanism until such time as the cycle commences. When the machine is set in motion, the carriage moves in a reverse direction until a lifting arm fixed on the carriage engages the work carrier. The lifting arms on one side of the carriage are then actuated and elevate the work carriers at all transfer points on one side of the machine. The carriage moves forward to the next station, and the lifting arms then deposit the carriers which are being transferred, and disengages from them. When the lifting arms are being raised on one side of the machine, others are being lowered on the other side. Thus, by one forward and reverse motion of the carriage, the work is progressed in one direction on one side of the machine, and in the opposite direction on the other side.

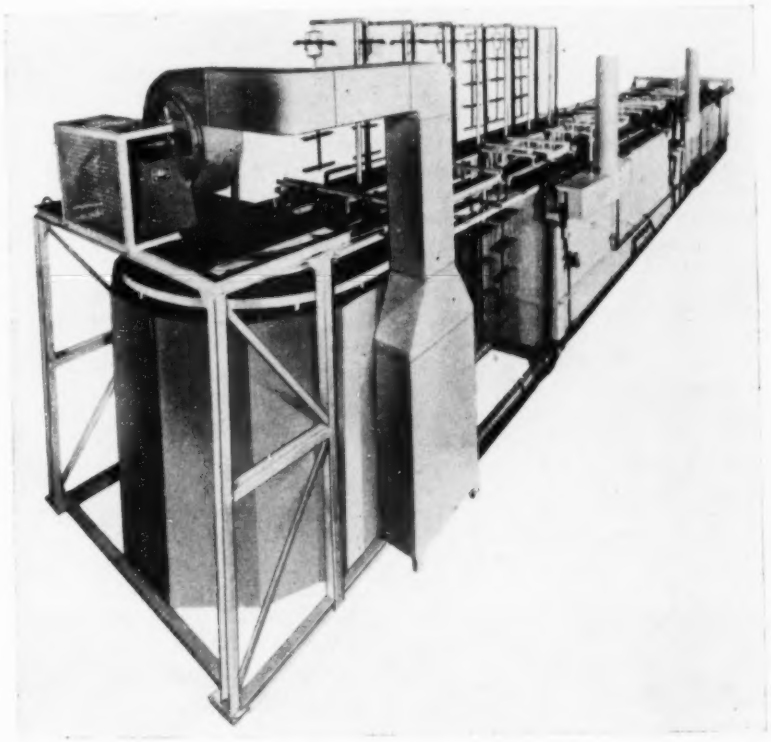
When a carrier is deposited in a multiple station tank, it remains supported on two rails and is progressed through the tank by means of pushers attached to the carriage and moved by the carriage motion. If the station happens to be an electrified tank, the rails act as anode or cathode bars.

With the exception of some castings, all parts, such as racks, pinions, drive gears, bearings, cylinder, casters, etc., are standard parts and can be obtained from any local supply house.

Hydraulic pump and valves are used for power and controls. Decelerating valves, actuated by cams, bring each motion to a gentle stop. Two sets of controls are provided for the control of production and cycle time. Adjustable hydraulic flow control valves are used to control the speed of each movement. In addition, adjustable electric interval timers provide any time hesitation desired at the end of each basic movement.

For example, if it should be desirable to reduce drag-out, the interval timers can be set to cause a hesitation at the end of the lifting movement, to allow time for the solution to drain off the parts. Should it be desirable to increase the dwell time on one side of the machine and decrease it on the other, the interval timer at the end of one of the horizontal motions can be adjusted. Should a process require a very short immersion time at any one station, a delayed set-down can be provided. A means of skipping a station can also be incorporated into the machine.

Mechanical, air or liquid agitation can be furnished. In some cases when very low rack per hour production, or when extremely fast transfer time is a necessity, a two shaft machine can be supplied. In this type of machine the lifting arms on both sides of the carriage are not actuated simultaneously, but act independent of each other. This design permits extremely long dwell times in single station tanks, and fast transfer of work from station to station. *Wagner Brothers, Inc.*



Latest in Wagner Bros.' automation of electroplating.

Circle 69 on page 89 for more data

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89

Gage Checks Jet Engine Shaft

A jet turbine shaft and wheel assembly is accurately and rapidly inspected at several points by this type of Precisionaire gaging machine.

The two-in. inside diameter running from the left hand end of the shaft toward the wheel, is checked to its full depth of 39 in. with an air spindle. The 0.003 in. total indicator reading concentricity of this bore diameter with the two outside diameters is checked at six places simultaneously by an air spindle having six Plunjet gaging cartridges equally spaced along its length. The part is rotated by hand 360 deg during this operation.

Another inside diameter near the wheel and the 0.003 in. total indicator reading concentricity of this diameter are inspected with a short air spindle containing a pair of jets for diameter check and a single jet for concentricity. Three outside diameters, one next to the wheel, another in the center and the third near the left end of the shaft, are checked simultaneously by three Airsnaps. Other points checked are (1) the 0.001-in. face runout of the 10.750-in. diameter, (2) the 0.001-in. face runout of the 6.625-in. diameter, (3) the runout of the 10.750-in. diameters, (4) the 17.149 plus or minus 0.006-in. diameter over the buckets and (5) the 0.0002-in. total indicator reading runout of the face of the 2.8125-in. diameter.

Each diameter inspection point has its own glass column, and the position of each float in its column shows whether or not the dimension or condition being checked is within tolerance. *Sheffield Corp.*

Circle 70 on page 89 for more data

Pressure Tester

A line of vertical pressure testing machines that detect and locate leaks in castings, as well as brazed, welded and soldered assemblies, is air-operated and electrically controlled.

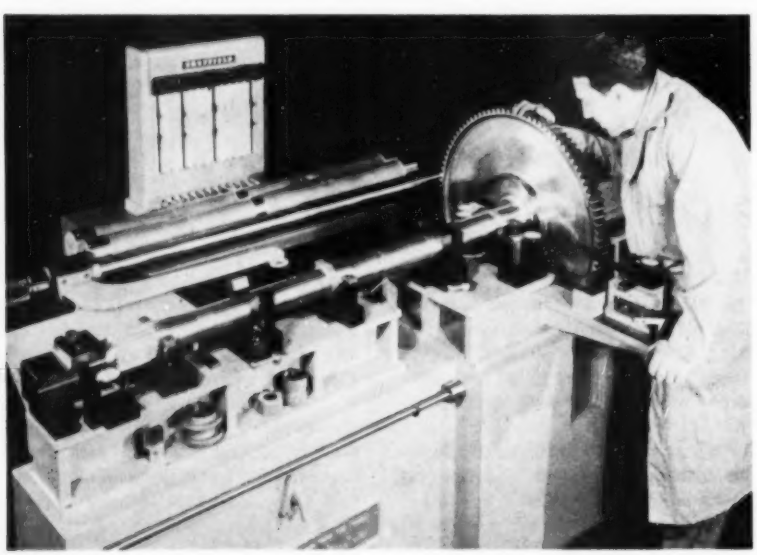
Testing a rifle grenade assembly for pressure leads on the Hautau machine.

The machine illustrated detects and locates leaks in a rifle grenade assembly fabricated by soldering together several spun copper parts. Four test stations are provided in the machine to enable the testing of four grenades at a time. Two stations are unloaded and loaded while two stations are making the 10-sec air check.

Unit mounting of the measuring system components for each station on individual panels at the rear of the machine, plus separate air clamping cylinders for each station, permit machine to continue to function regardless of the operating condition of an individual station. Three signal lights indicating the result of the pressure test are located under each station. Two of the signal lights locate leaks in the grenade soldered joints by indicating whether the leak is between chambers or to the atmosphere. The other indicates approved parts.

The pressure testing machine is 6½ ft high, 38 in. wide and 26 in. deep. It is of welded steel construction and weighs about 800 lb. The machine operates from an 80 psi air source and a 110-volt line. Precision pressure gages in the cycle control panel permit individual control of each station. Complete cycle time to load, check and unload two parts is 17 seconds. *Hautau Engineering Co.*

Circle 71 on page 89 for more data

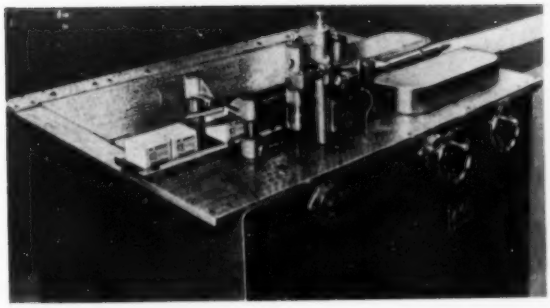


Using the Sheffield Precisionaire gage to check a turbine assembly.

Package Marker Is Faster

Redesigning of the Markocoder 3M automatic package imprinting machine, which prints identification data and code-dates on the top or ends of cartons and boxes as an integral packaging-line operation, has just been completed.

Operating speed of the machine has been increased to permit imprinting of small cartons at rates up to 600 units per minute. The length of the machine now measures only 54 in. as compared to the previous length of 72 in. The new model is said to be more versatile because it can handle cartons of unusual dimensions within its range, as well as rectangular cans. Also, it will print very close to the bottom of a package instead of requiring a 3/16 in. margin as heretofore, and can be adjusted for closer registration control during the regular imprinting operation. Additional improvements have been made to permit quicker change-over for cartons of different sizes as well as a more rapid method of changing ink color and die wheel. The ink pump is now an integral part of the imprinting machine, eliminating need for a separate motor. *Adolph Gottscho, Inc.*



The Markocoder 3M imprinting machine.

Circle 72 on page 89 for more data

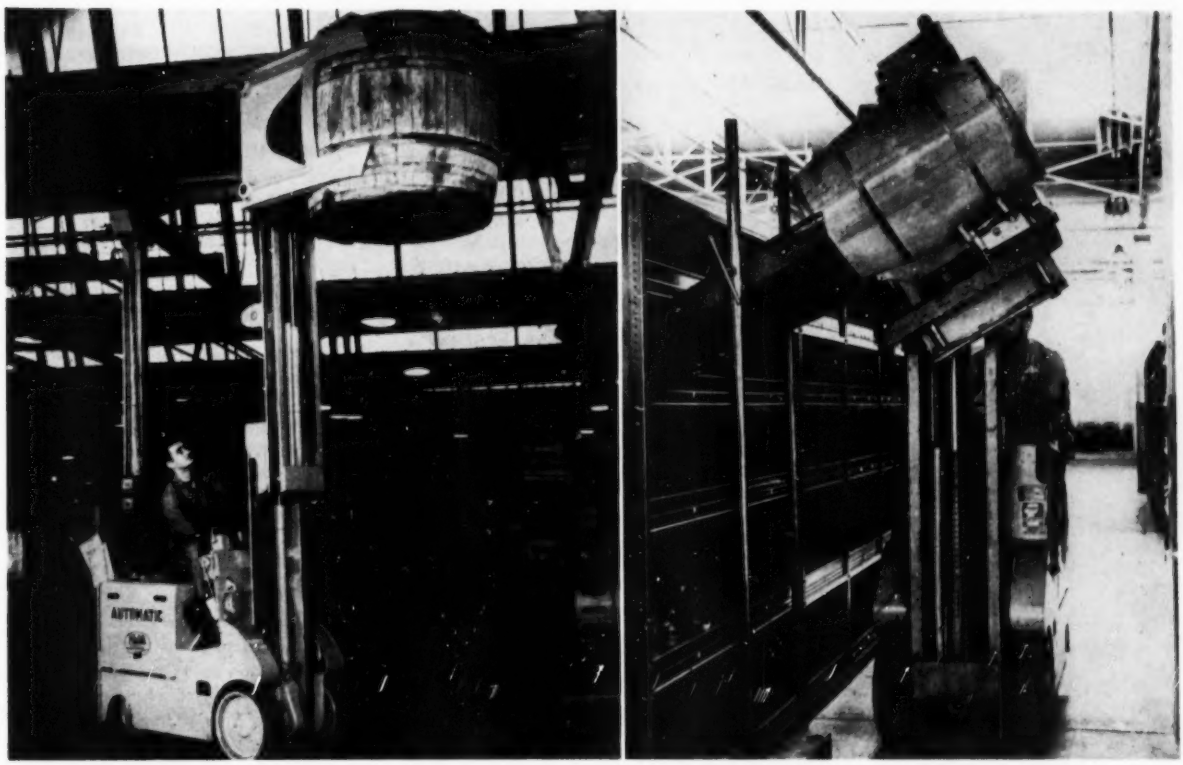
Free-Wheeling Clutches

A line of heavy-duty free-wheeling clutches accommodate up to eight in. diam shafts and are especially designed for extreme service in heavy-duty applications.

The clutches have heavy-duty roller bearings for hub supports. They have multiple rollers operating in a hardened outside casing. They are positive and non-slipping and yet provide low resistance to free wheeling. Small outside diameters for a given shaft size are said to make them especially suitable for machines which have many shafts close together. *Odin Corp.*

Circle 73 on page 89 for more data

Clamp Attachments Give Fork Truck Extra Uses



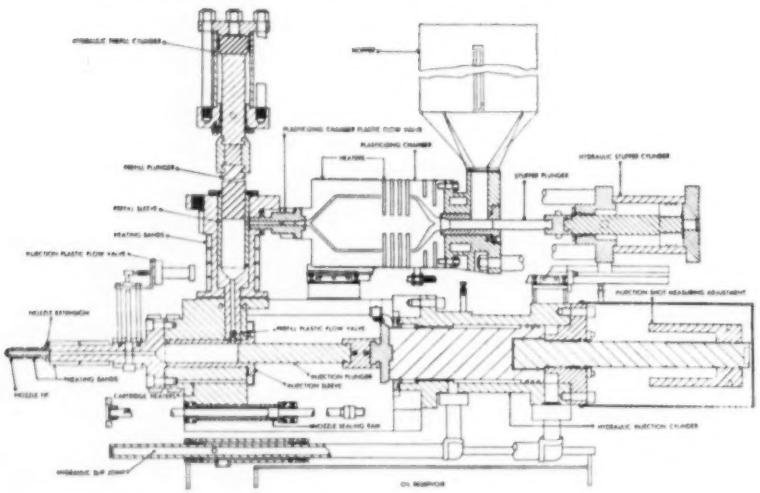
Hydraulically-actuated clamp attachment for fork trucks permits handling large or small wooden barrels and vats, for moving or tiering to heights of 130 in. The device handles barrels weighing up to 3000 lb. with diameters up to 40 in. Barrel clamp and rotating carriage combination features attached chute to guide loose parts, such as nuts, bolts, or small castings, into storage bins. Hydraulically operated, clamp slips over truck's forks, and can be quickly and easily removed. (Automatic Transportation Co.)

Circle 74 on page 89 for more data

NEW EQUIPMENT PLANT • PRODUCTION

For additional information please use postage-free reply card on page 89

High-Speed Injection Molder Measures Shot



Schematic of the H-P-M Model 1200-P-200 pre-plasticizer.

A large-capacity pre-plasticizer which claims several firsts was announced recently. Features include high-speed injection—200 oz every three min. It offers a positive "shot" measuring device. The machine plasticizes independently of the machine cycle, as it has a pre-plasticizing device with charge cylinder.

The high-speed clamp buildup feature gives pressures to 1200 tons in less than four seconds. Hydraulic ejectors are mounted on the stationary die-head side to eliminate the use of pull chains when ejection is from the sprue side.

Shorter mold setting time is claimed with a built-in hydraulic mold elevator and positioner.

Other features claimed for this type of pre-plasticizing are: Less chance for discoloration or burning, lower injection pressure which permits more efficient use of mold clamp pressure (molding parts with larger projected area), minimum pressure loss in injection chamber, material is more fully plasticized, total elimination of weigh feeding mechanisms, and less critical cycle timing.

This unit can generally be stopped for mold change; and, operation again resumed without loss of material or waiting for material to be heated to molding temperature.

The Model 1200-P-200 pre-plasticizing unit will mold commonly used virgin thermo-plastics, such as polystyrene, cellulose acetate, cellulose acetate butyrate, and acrylics. *The Hydraulic Press Mfg. Co.*

Circle 75 on page 89 for more data

Vapor Degreaser

Recently introduced is this vapor degreaser which provides quick, thorough vapor cleaning with one compact unit. Unique features are two vapor controlling condensers; large work clearance—31 in. long, 20 in. wide, 16 in. deep; divided tank to provide boil sump and spray pump sump; pressure spray; and two safety thermostats. Operation requires 220 v single phase electrical outlet and standard water supply. Normal capacity is 500 lb of steel per hour. (Manufacturers Processing Co.)

Circle 77 on page 89 for more data

Dew Point Controller

Recently offered is an automatic dew point controller which regulates atmosphere dew point in controlled atmosphere metal treating furnaces. The self-contained unit, which operates electronically, continuously records and controls furnace dew point. It is said to make possible completely automatic heat treating cycles such as carburizing and carbon restoration.

Adjustable to meet any required dew point within the capacity of the particular furnace to which it is attached, the dew point controller pumps furnace atmosphere through a 5/16 in. steel tube. By use of a cooling element, it condenses water on a measuring device. This condensation temperature is measured electrically, then indicated, recorded, and controlled. *Ipsen Industries, Inc.*

Circle 76 on page 89 for more data

PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

Steam Cleaning Machine for Parts

Now on the market is a high-capacity steam cleaning machine that is said to be capable of discharging 150 gal of balanced cleaning solution per hour. Called Model LH, the unit offers a graduated range of cleaning pressures extending from 30 psi for such jobs as paint stripping, to 100 psi for the rapid cleaning of heavily encrusted or grease-coated parts and surfaces.

A wide variety of models is available: oil-fired and gas-fired; electrically driven and gasoline engine driven; portable, stationary, or trailer. Each can be optionally equipped with remote nozzle control.

All units are equipped with temperature and pressure gages, valves, and steam outlet grouped on a central panel. *Clayton Manufacturing Co.*

Circle 30 on page 89 for more data

Portable Polisher for Removing Glass Scratches

Recently developed is a light portable polisher for removing light scratches from glass. The unit weighs only seven lb and is nine in. over-all length.

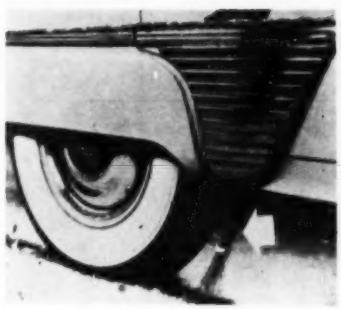
The tool is powered by a universal a-c or d-c motor for 115-v operation using six amp. It has a main gun-type handle with power lead-in, and a second handle at right angles to permit ease of balance and control of pressure in the operation of the tool.

A white wool felt polisher head three in. in diameter and 1¾ in. thick fits tightly into a precision-machined adapter which screws onto the main drive shaft of the motor. A sample container of cerium oxide and a tube of cement for mounting the polisher felt in the adapter come with the unit.

A back rest which fits onto the aluminum motor housing is said to be useful in the operation of the tool. *Glass Center Enterprises, Inc.*

Circle 31 on page 89 for more data

Electronic Sander for Cars and Light Trucks



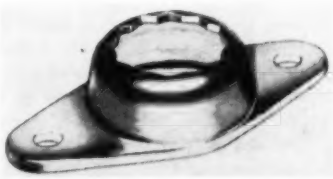
Now on the market is a push-button electronic sander for automobile and light truck installation that is said to provide instant traction between tires and icy roads.

Known as Grip-King, the unit is designed to deposit grit before the rear wheels of vehicles for safer starts and stops, to control skidding, and to provide traction whenever needed.

For traction on ice, the driver touches a dashboard switch which electrically operates solenoid valves in twin grit hoppers installed near the rear wheels. Specially prepared grit is released through self-ventilating, non-freezing nozzles in front of the wheels to provide traction. An indicator light on dashboard signals the driver before replacement is needed. *Tenna-Lite Corp.*

Circle 32 on page 89 for more data

Retainer for Wrenching Nuts



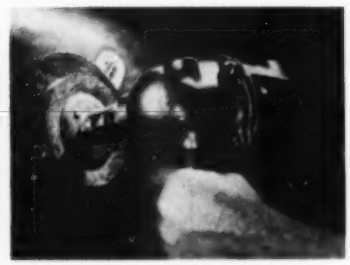
Now in production is a retainer for making a high-strength anchor nut out of the standard external wrenching nut. Rivet hole spacing has been adopted to provide interchangeability. The unit is made of cadmium plated steel and is said to provide a fastener combination capable of resisting 160,000 psi minimum tensile stress. *Nutt-Shell Co., Inc.*

Circle 33 on page 89 for more data

(*Turn to page 88, please*)

NEW PRODUCTS

For additional information, please use postage-free reply card on page 89



Sanding Disk Adapter

Recently developed is a sanding disk adapter for the automobile repaint trade. It is claimed that accessories for disk sanders can be securely snapped into place or quickly removed without spanner wrenches.

Called Model JK-1, the adapter has two components: the base which threads permanently onto the standard spindle of the grinder; and the top which threads into the accessory to be mounted. By equipping several accessories with tops they can all be kept ready for use on one tool. *Behr-Manning Corp.*

Circle 34 on page 89 for more data

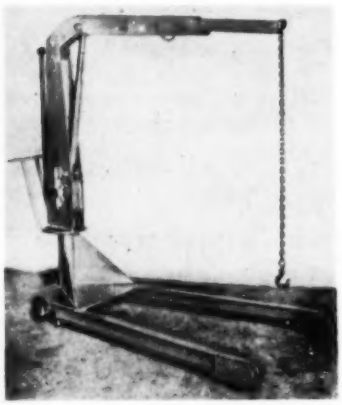
Heavy-Duty Engine

Now in production is a heavy-duty engine known as the K-660. A four-c, aircooled, two-cyl opposed power plant, it is said to deliver up to 26.8 hp at 3600 rpm.

The engine weighs 225 lb. Its overall dimensions are: length, 18 13/16 in.; width, 23⅛ in.; and height, 27 9/16 in.

The governor is adjusted at 3000 rpm with load unless otherwise specified. At this speed, the engine delivers 24.4 hp and 42 lb-ft of torque. *Kohler Co.*

Circle 35 on page 89 for more data



Truck-Shop Crane

Recently added to a line of truck and shop cranes is a ½-ton model. The unit has four wheels instead of three to give it greater stability. Only 33 in. wide at its base spread, the crane is said to lift 1000 lb of materials or equipment. An optional electric power unit for greater ease and speed in operation is offered. *Star Machine and Tool Co.*

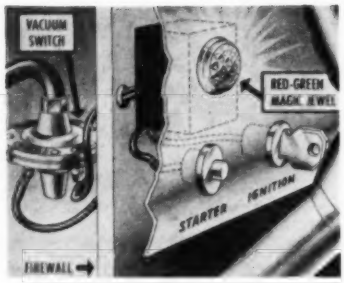
Circle 36 on page 89 for more data

Air-Operated Jack

Recently announced is an air-operated jack for labor-saving elevation of vehicles. It has wide sliding adjustable carriage arms with two parallel end brackets, which are said to fit securely under the vehicle's front or rear bumper without danger of slipping.

The jack can reportedly be used on all models of passenger cars and light pickup trucks, even those with low frame suspension. *Supreme Equipment Corp.*

Circle 37 on page 89 for more data



Automatic Starter

Now on the market is a dual-control device called Gyro Start-Control which is said to provide automatic starter operation and a visual indication of motor efficiency by use of a dash-mounted signal light called the "Magic Jewel." The latter automatically changes from green to a danger signal red when the motor stalls or is running inefficiently.

A vacuum-operated switch connected to the intake manifold activates a red light when loss of vacuum indicates less than optimum operating conditions. It also automatically energizes the starter solenoid if the motor stalls. *Gyro Control Co.*

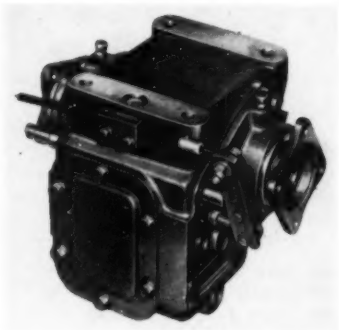
Circle 38 on page 89 for more data

Battery Charger

Model BC-54 portable 6/12-v fast charger incorporates a dry rectifier and is said to be protected by an automatic reset circuit breaker.

The unit reportedly will restore starter operation in five minutes and recharge six or 12-v batteries in two hours or less. *King Electric Equipment Co.*

Circle 39 on page 89 for more data



Truck Transmission

Recently announced is a two-speed auxiliary transmission. Called the Brownie Junior, it is available either as an overdrive or as an underdrive. The unit is especially designed for light-duty and pick-up trucks. *H. S. Watson Co.*

Circle 40 on page 89 for more data

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FREE LITERATURE

Anti-Corrode Coating

Zincilate, a protective coating for metal said to replace other forms, is explained in bulletin Z-853. *Industrial Metal Protectives, Inc.*

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Thermistor Uses

Latest information on methods of using Thermistors, heat-sensitive electrical resisters with negative temperature coefficient, as well as a description of a new physical demonstration of permanent magnet properties, is available in four technical data sheets. *Carboloy Dept., General Electric Co.*

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Hand Conveyers

A catalog on hand pushed trolleys, cranes, and switches, 16 pages, contains complete specifications on the above equipment. *Jervis B. Webb Co.*

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Barrel Finishing

A 32-page handbook and catalog on "Lorco" compounds for descaling, deburring, abrasive cut-down, nonabrasive cut-down, finishing, coloring, burnishing, metal cleaning and rust inhibiting is now available. *Lord Chemical Corp.*

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Controlled Valves

Condensed catalog No. 531 — just issued — describes the Quick-As-Wink line of air and hydraulic control valves, valve couplings, etc. *C. B. Hunt & Son, Inc.*

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Intercooler

A catalog supplement for a supercharger air intercooler catalog No. 1652 describes both high and low pressure type intercoolers. *Young Radiator Co.*

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Automatic Chucker

Specifications and descriptions of model 2AC single spindle automatic chucking machine are now available. *Warner & Swasey Co.*

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Accelerometers

Subminiature shock and vibration pickups are described in bulletin A314. *Gulton Mfg. Corp.*

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Silicone Products

Now available is a reference guide to the characteristics and uses of silicone products. *Dow Corning Corp.*

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(Please turn page)

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Glass Part Uses

An eight-page catalog showing 21 case histories of glass part applications has just been issued. Each includes a photograph of the glass part and a brief explanation of the advantages of the type of glass used for that particular application. *The Lancaster Lens Co.*

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Drill Unit

A brochure just completed describes the light weight Holomatic Model 14 drill unit, air actuated and automatic in both advance and retract motions. *Hause Engineering.*

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Finishing Systems

A 16-page catalog on "Complete Finishing Systems" has just been published. Both integral (self-contained) systems and unitized types are covered. Processes outlined include: pre-treatment—acid, alkali or solvent cleaning; paint application—by spray, dip or flow; drying—using gas, steam, oil or electric heat and make-up air—replacing plant air exhausted by the three previous operations. Write to *Cincinnati Cleaning & Finishing Machinery Co., Schmidt Bldg., Cincinnati, Ohio.*

Foamed Plastic

Lockfoam's uses for construction, electronic devices, packaging, reinforcement of automotive and aviation equipment parts, thermal insulation, and vibration dampening are shown in a 28-page booklet now being offered. *Nopco Chemical Co.*

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USE THIS POSTCARD

Automatic Bar Feed

A four-page folder describes an automatic magazine loading pneumatic bar feed for use with most types of single-spindle automatic screw machines as well as abrasive saws, cut-off machines, punch presses and centerless grinders on jobs calling for machining brass, steel or aluminum bar stock or tubing. *Lipe-Rollway Corp.*

Circle 13 on postcard for free copy

Threaded Fasteners

Triplex threaded fastener catalog No. 530 is now available. Looseleaf, the indexed catalog contains 80 pages of weights and dimensions on a complete line of nuts, bolts, screws, sems, washers, rivets and specials, including the latest prices as of July 20th, 1953. Copies may be obtained by writing Mr. J. J. English, *The Triplex Screw Co., Div. of Murray Corp. of America, 5317 Grant Ave., Cleveland 5, Ohio.*

Emulsifier

Technical bulletin No. 38 brings up-to-date information regarding Emcol H-50A, an aliphatic hydrocarbon emulsifier designed for emulsion degreasing, fuel oil desludging, and other applications. *Emulsol Corp.*

Circle 14 on postcard for free copy

Metal Coating

A sample of Vinsynite, a metal pretreatment used in metal finishing and maintenance, is included in a new set of literature recently released. *Specialty Coatings, Inc.*

Circle 15 on postcard for free copy

Tool Accessories

A pocket size bulletin gives the complete story on the firm's machine tool attachments and accessories. *South Bend Lathe Works.*

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BF Spindle

A four-page bulletin describing the BF spindle, used in conjunction with Fosdick automatic positioning, is available on request. *Fosdick Machine Tool Co.*

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Hydraulic Cylinders

Bulletin No. 2 describes how steel cylinders with glass-smooth surfaces and without taper for hydraulic use can be produced by the steel Koldflo process. Units can be formed in sizes ranging from one to 6½ in. in diameter in any wall thickness down to 0.060 in., and larger sizes can be extruded up to 42 in. long. *Koldflo Div., Mullins Manufacturing Corp.*

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(*See preceding page*)

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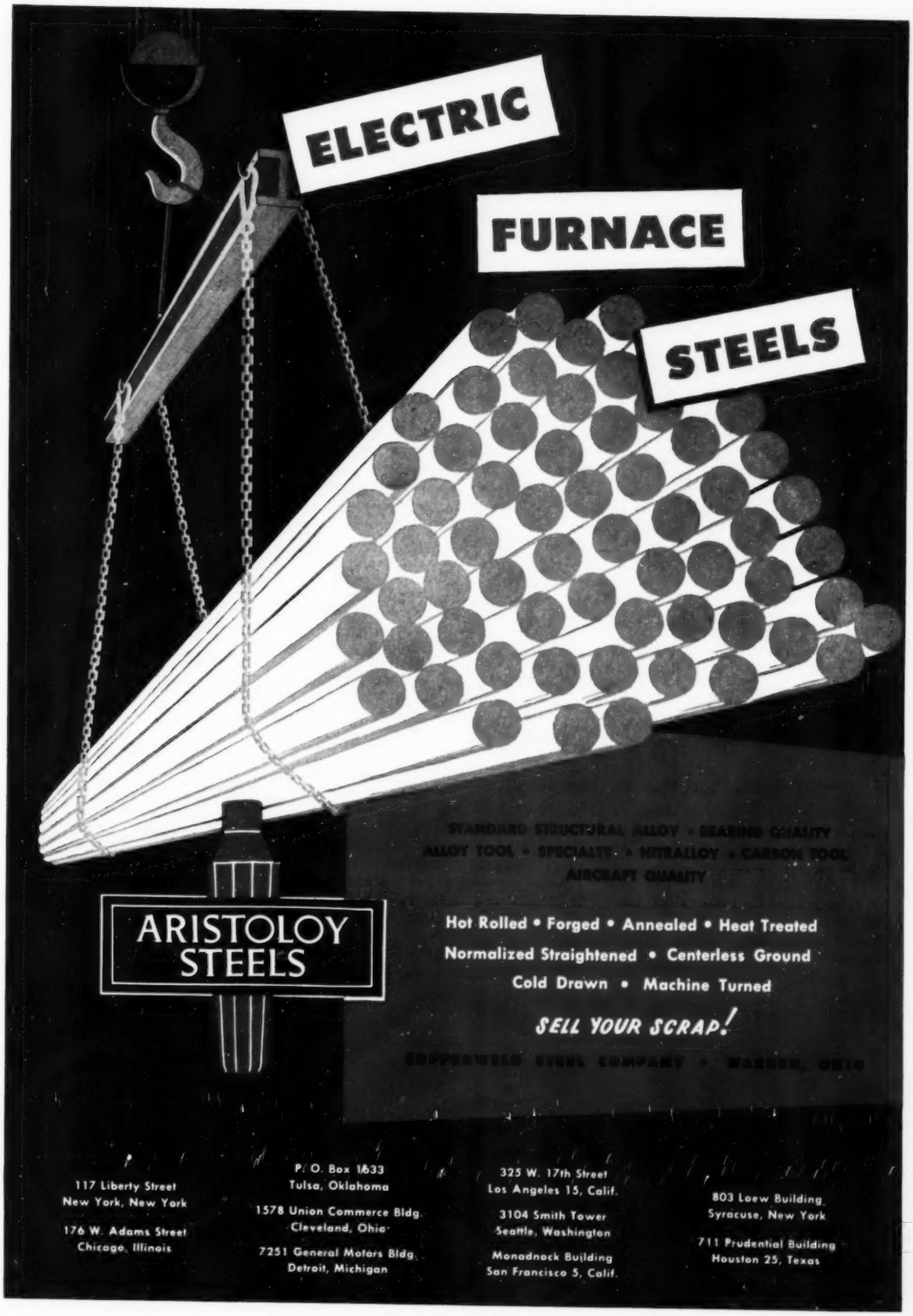
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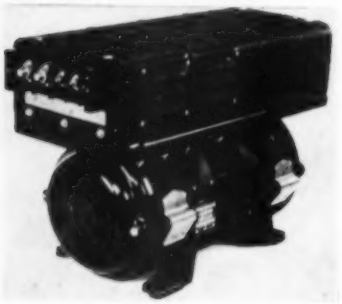
NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

High-Altitude Inverter



Recently announced is the F137 inverter that is said to be capable of 1500 va output at 50,000 ft and a 20 C ambient temperature. The 115-v, 400-c single-phase unit is reportedly useful in freeing aircraft of such critical high-altitude inverter problems as overheating, insulation breakdown, and excessive brush wear. Function of the inverter is to convert d-c to a-c power for instruments, controls and other accessories.

The new inverter is a substantially modified version of the manufacturer's standard rotary inverter. Major design modifications for high-altitude operation include: improved electrical insulation; redesigned commutators and brush arrangements; new housing configuration for better air flow; and a new speed and voltage regulator assembly. *Jack & Heintz, Inc.*

Circle 46 on page 89 for more data

Panel Instrument

Recently announced is Model AN3 panel instrument. The single-element unit is said to meet AND 10401 requirements for 2¾ in. dial instruments. *Marion Electrical Instrument Co.*

Circle 47 on page 89 for more data

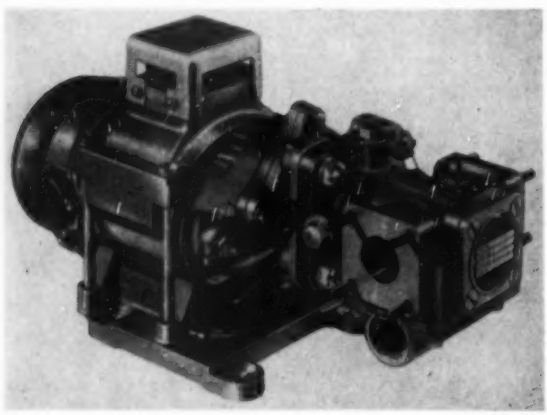
Oil Pump for Use in Multi-Engine Aircraft

Now in production is Model RG-9840 self-priming, rotary-vane, positive displacement oil pump which transfers lubricating oil from tank to tank within multi-engine aircraft. The relief valve reportedly protects the aircraft system by limiting discharge to 300 psi and is adjustable to lower pressure.

The geared electric motor is a 0.35-hp, 27-v, d-c unit. It is reversible through external electrical terminals. Pump valve may be installed for either direction of rotation.

Rated capacity of pump with oil at 70 to 90 F and 20-in. Hg suction and 50 psi discharge is 2.75 gpm. Ports are designed to AND10086 for one-in. tubing. *Lear-Romec Div., Lear, Inc.*

Circle 48 on page 89 for more data



Lear Oil pump

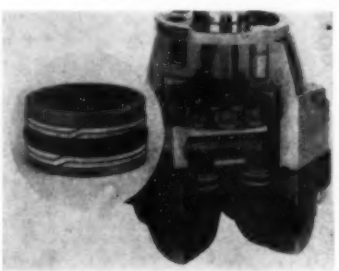
Spiral Back-Up Rings

Now on the market is a series of Kelon-T spiral back-up rings for aircraft as well as industrial use that are said to protect rubber O-Ring seals indefinitely from extrusion, deterioration, or loss of efficiency.

Designated Series SR-6144, SR-7234, and SR-2619, the rings have chamfered ends. Spirals with square ends are also available. Packaged on shipping mandrels, they reportedly allow easy assembly and hold their shape in the free condition.

It is claimed that the chemically inert spiral packings will not swell, shrink, harden, or soften, and are unaffected by acids, oils, or bases or solvents. Useable temperatures range from —110 F to 300 F.

They are available in 153 sizes ranging from 0.125 to 15.50 in. I.D.



and are interchangeable with AN6246 (6144), AN6244 (7234), and AN6291 (2619) back-up rings. *W. S. Shamban & Co.*

Circle 49 on page 89 for more data

Gasketing Material

Now available is a gasketing material that is said to be equally effective at high temperatures and the low temperatures of high-altitude flying. Called Fluorlastic gaskets, they reportedly combine the chemical resistance of Du Pont Teflon tetrafluoroethylene resin with the resilience and flexibility of silicone rubber. *Joclin Manufacturing Co.*

Circle 50 on page 89 for more data

Engine parts you can take for granted

...whether it's a reciprocating engine

...or a jet

OVER 50 years experience in research and manufacture are behind Thompson's ability to produce precision-engineered parts for today's airplanes.

Throughout the long history of flight, Thompson has played an increasingly-important role in the design, development and manufacture of parts made to the most exacting specifications where tolerances are measured in .0001 inches. And today, airplane engine manufacturers count on Thompson for precision-engineered parts, such as valve seat inserts and piston pins for reciprocating engines and a wide variety of exacting parts for jet engines.

Engine manufacturers know they can count on Thompson for exact tolerances, maximum performance and service, and dependability of supply. You, too, can count on Thompson. If you are having trouble with engine parts, or if you need a better or more dependable supplier, write or call Special Products Division, Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland 3, O.

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METALS

Lower Delivered Prices for Steel with Producers Paying Freight Charges. Nickel Decontrolled for Civilian Users.

By William F. Boericke

Move Is General for Freight Absorption by Steel Mills

No spy-glass is needed by a steel salesman to see his competitors hot on his trail to buyers. Producers are scrambling for business. The truest indication that steel is now in a buyers' market is the bandwagon rush by virtually all steel mills to follow Big Steel's dramatic announcement October 1, that when necessary and commercially desirable in order to get the business of an individual customer, it will meet the lower delivered price of a competitor.

In plain English, this implies that when hard selling requires freight absorption, U. S. Steel will pay freight charges heretofore paid by the buyer but not for steel in heavy demand.

The revised sales policy does not yet mean any reduction of mill prices which are still quoted f.o.b. mills. But buyers in competitive areas will have lower delivered prices quoted them from distant suppliers. This will be particularly true for items in over supply, notably wire products and tin plate. It's going to cost the steel producers a sizable amount. One estimate runs to $80 million a year to absorb freight, other estimates are higher. It depends on how far freight absorption goes. Mills in the Pittsburgh area which produce more steel than normally consumed will be most affected, Chicago producers least where consumption exceeds production.

Steel Scrap Price Down 30%

The precipitate decline in steel scrap prices appears to have finally been halted. From a peak of $44.92 per ton at the end of July the composite price dropped within ten weeks to $31.33, where it steadied. As steel scrap long has been regarded as a fairly reliable barometer for future steel demand, the 30 per cent drop in price, which was accompanied by drying up of orders, contributed heavily to the growing uncertainty in the industry. But it is quite possible that this traditional role of steel scrap as a forecaster of steel activity may be exaggerated. The heavy decline in scrap prices may be nothing more than a normal correction of demand and supply within the scrap industry itself. Scrap prices have always been highly volatile.

Lower Steel Demand Ahead

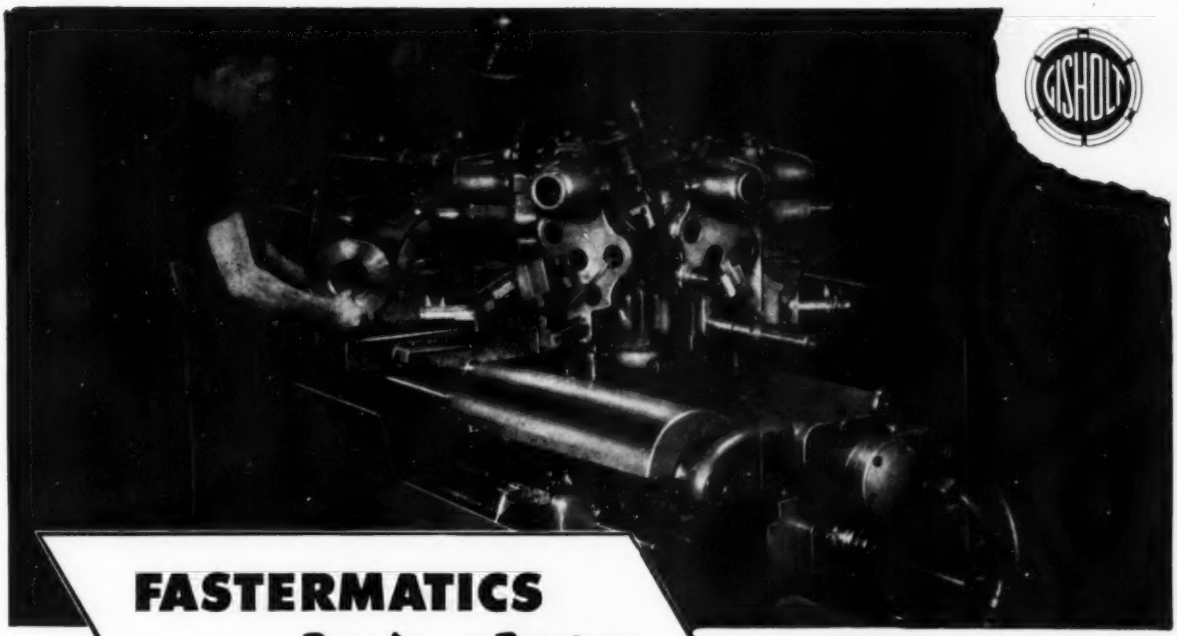
Other factors besides falling scrap prices indicate definitely that steel demand is likely to taper off before the end of the year. Conversion business is out of the window and premium prices are likewise gone. Cancelations for fourth quarter delivery have been increasing as consumers have regained their normal inventory positions. Automotive steel deliveries have slumped as manufacturers determined to cut buying because of the slower tempo in the motorcar industry. Competition from foreign steel mills is reported keen on the Atlantic coast, with some price cutting in nails

(*Turn to page* 120, *please*)

STEEL REQUIRED FOR TYPICAL FOUR-DOOR SEDAN OF ONE CAR MANUFACTURER

	STEEL BARS			STRIP STEEL		SHEET STEEL		WIRE PRODUCTS	STEEL PLATES	TERNE PLATE	STRUCTURAL SHAPES	PIPE & TUBES (Seamless)	TOTALS
	Hot Rolled	Cold Rolled	Forgings	Hot Rolled	Cold Rolled	Hot Rolled	Cold Rolled						
STEERING MECHANISM	20.5	10.3	1.2	1.4	0.9	6.2	7.2	3.6	0.3				51.6
ENGINE AND CLUTCH	28.4	34.8	137.5	31.6	23.7	42.7	22.1	17.4	7.9	10.8			356.9
FRONT END SUSPENSION	47.2	7.7	57.4	9.5	2.2	18.2	0.2	2.6					145.0
BRAKES, WHEELS AND TIRES	3.5	10.1	0.4	146.4	1.5	69.3	11.0	13.6					255.8
BUMPERS, GUARDS, ETC.	5.4	1.4	25.1	26.7	78.2	7.4	51.7	3.4			5.8		205.1
FUEL TANK AND EXHAUST SYSTEM	1.1	0.7		1.6	23.8	3.4	20.6	0.5		17.3		0.7	69.7
FRAME						248.5	45.4	5.7					299.6
ELECTRICAL SYSTEM	0.5	2.9		5.1	5.3	3.1	17.4	2.8		0.1			37.2
TRANSMISSION	4.6	22.4	42.9	1.0	2.1	0.4	4.1	2.1					79.6
RADIATOR AND GRILLE	0.5			4.2	1.8	14.7	51.1	0.9		5.3		0.4	78.9
BODY, HOOD AND FENDERS	7.5	8.3	0.9	53.9	115.7	160.2	1185.7	96.1		22.9		0.1	1651.3
REAR AXLE & REAR END SUSPENSION	84.9	15.8	54.9	10.8	2.4	94.6	13.1	6.7	18.2			9.8	311.2
TOTALS	204.1	114.4	320.3	292.2	257.6	668.7	1429.6	155.4	26.4	56.4	5.8	11.0	3541.9

Prepared and published by "STEEL FACTS" American Iron and Steel Institute, October, 1953



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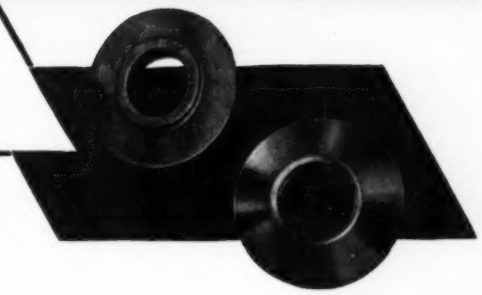
Produce Faster— Pay Off Faster

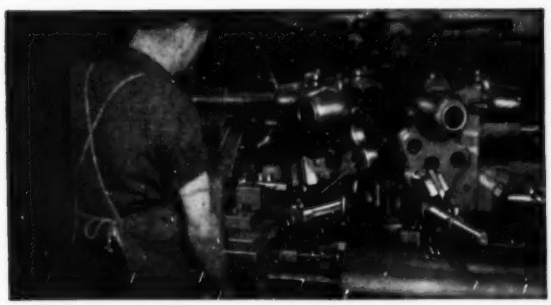


It may seem incredible, in this day and age, for any major machine tool to "buy" itself in nine short weeks of operation. But that's exactly what the Fastermatic Automatic Turret Lathe did on this job of machining clutch plate hubs.

Former time, on hand-operated turret lathes, was 15 minutes per piece. The Fastermatic, with automatic control of all machine functions, reduced the time to only 3 minutes, floor to floor.

Earnings piled up so fast over former production costs that the Fastermatic paid for itself in just 9 weeks—or 893 hours of operation.

Do you have work that permits a number of cuts in one chucking? Investigate the Fastermatics. You may have a big opportunity to increase production, cut costs and save man power.



In this tooling setup, only 3 turret faces are needed to turn each part. With duplicate tooling on the remaining 3 faces of the hexagon turret, 2 parts are machined with each complete turret cycle. The operator merely loads and unloads the work.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Observations

By Joseph Geschelin

Parts Makers

The role of parts and accessory producers in the automotive industries is well known. They supply a large variety of parts and assemblies and accessories that go into cars, trucks, tractors, engines, airplanes, and industrial equipment. But what is more important is that these suppliers comprise enormous aggregate of specialized know-how and research facilities which supplement in a major way the facilities of primary producers. They are responsible for the wealth of new developments that improve vehicle performance year by year. And their specialists are prepared to find the answers to new problems as they arise in the launching of new models. The parts industry has been with us so long that there may be those who do not appreciate fully the role these specialists play.

Electrostatic Painting

On a number of occasions in the past we have commented on the unique features of Ransburg electrostatic paint spraying equipment. One of our friends recently told us of a new Ransburg installation in one of his plants, termed the Modified No. 2 process. This unit employs a rotating disk for distributing paint, in contrast to the cone-shaped nozzle used in the latest No. 2 process. It is being tested on some automotive parts preparatory to adoption.

Automatic Factory

According to a bulletin received from the Stanford Research Institute, electronics for military, industrial, and home use represented a $6-billion industry in 1952. The automatic factory is a reality in the automotive industries today largely due to the efforts of pioneers such as Ford Motor Co., Chrysler, General Motors, and others. SRI now is engaged in developing fully automatic methods for the manufacture of electronic equipment, a project of more than passing interest to automotive manufacturers.

Who Pays

One of the leading machine tool builders recently posed a knotty question that is as old as the industry itself. It requires a little detail to explain. Specifically, he gets an order for a new type of machine, and part of the requirement is to design the tooling and supply it with the machine. At the same time, he claims that most customers demand that he supply them with complete engineering details of the tooling. It sometimes happens that when the original tooling—it may be a large unit such as a broach—wears out the replacement is made by a local tool shop rather than the original supplier. Obviously, the local outfit can produce the tool cheaper because he has no engineering expense to charge into the job. It is our feeling that when the initial equipment is sold its total cost should include the entire cost of special engineering, including design of the tooling. If the manufacturer charges all legitimate costs to the specific contract or order then he is compensated for his overhead and may be able to compete on better ground with the independent tool shop that uses his designs. We would like to have your comments on this important question.

Safe Cars

While motor car producers are engaged in a constant and successful battle to improve safety in motor vehicles, the critics still continue at the old stand. One of the most recent blasts was triple-barrelled. It demanded abolition of high powered engines, adoption of safety belts, and recommended rear engine cars as the answer to highway safety. The horsepower race admittedly is in full blast. As we view the offerings for 1954, we find that engine horsepower is still rising. But—it is important to note that increasing power does not imply correspondingly higher road speed. It does provide safety by increasing torque and thus enabling the driver to maneuver safely at middle range and high road speeds. Safety belts are being studied to determine whether they have any utility whatever in the automobile and we are willing to abide by the judgment of automotive engineers. Rear engine cars have been discussed for years in engineering circles. The consensus appears to be that rear engine drive is satisfactory in small cars with small, light powerplants. For large cars with big powerplants, such as are popular in the USA, the rear engine drive does not appear to hold any advantages whatever and would sharply increase the cost of manufacture as well.

Zirconium Progress

According to a recent statement by Allegheny-Ludlum, an expanded program for the production of zirconium strip and other shapes has been undertaken for use in industrial atomic energy applications. More recently, experimental work conducted on the production of zirconium tubing on the company's hot extrusion press suggests that this process also will be practical. Normal zirconium has not been satisfactory for atomic reactors due to the presence of traces of hafnium. Oak Ridge recently developed a type of zirconium sponge free from hafnium, the sponge being produced by the Bureau of Mines. Allegheny-Ludlum is said to be the first commercial organization to go into the melting of this sponge, using a double melting procedure involving unique furnaces operated at the company's Watervliet plant. It goes without saying that this special Government sponsored project may eventually provide industry with a supply of this useful element in its pure form.

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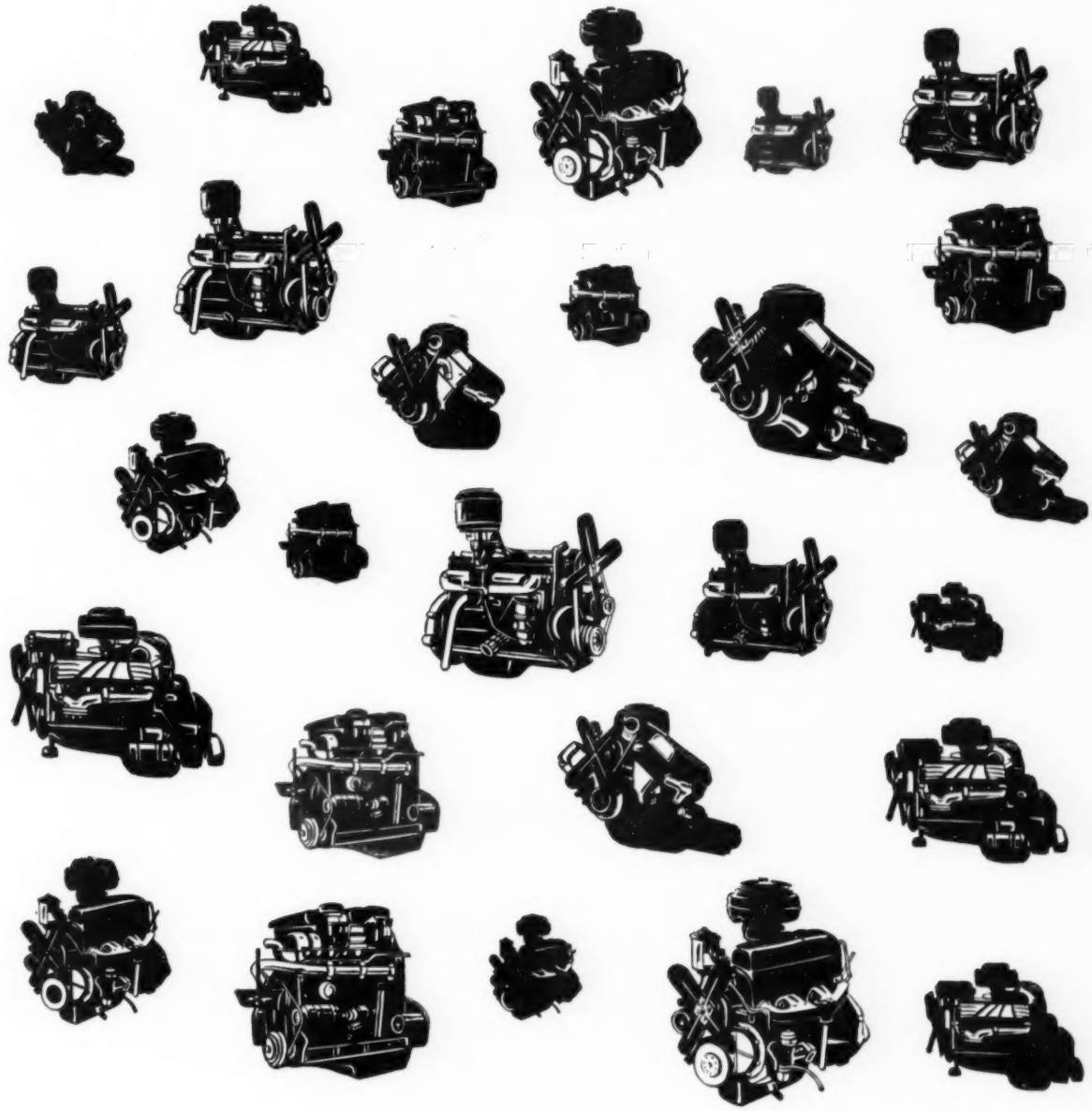


Here's a new engine ratio: 25 out of 27 leading engine manufacturers using chrome rings

specify Perfect Circle

The Standard of Comparison

The application of solid chrome plating to piston rings, as perfected by Perfect Circle, more than doubles the life of pistons, rings and cylinders. Performance data will be furnished on request. Write Perfect Circle Corporation, Hagerstown 3, Indiana.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 39

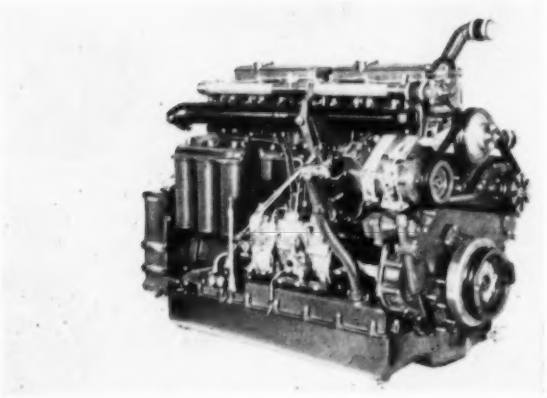
Rolls-Royce Diesels Have Dual-End Power Take-Off

After considerable experimental work at its new factory in Derby, England, the Oil Engine Div. of Rolls-Royce, Ltd., is now producing three Diesel engines intended for road and rail transport, heavy tractors, and stationary and marine purposes (see AUTOMOTIVE INDUSTRIES, Aug. 15, 1951, p. 51.) These four, six and eight-cyl overhead valve units are normally rated at 100, 150 and 200 hp, respectively, at 1800 rpm. Bore and stroke of all are 5⅛ in. by 6 in.

Potential applications for these basic engines have been increased by a versatile construction which permits main power take-off from either end, and the mounting of some of the auxiliaries on either side to suit the particular installation or for right or left-hand drive vehicles.

The machined and tapped facings on both ends of the motor block are identical. Thus, the flywheel housing and timing case may be interchanged without altering the crankcase. Similarly, the positions of the water pump and fan, and of the rear hose connection, may be reversed.

Provision is made for flange-mounting the starter on either side of the flywheel housing. The opening on the unused side is covered with a plate.



Rolls-Royce C6 SFL oil engine for Vickers VR180 tractor.

When the motor block is, in effect, reversed between the two end housings, a different timing case is used to allow for the drive to the fuel pump. Even with the cylinder block in a fixed position in relation to the flywheel and the timing assembly, the lubricating oil filters and release valve may be mounted on either side of the block, the fuel oil filters on either end of one side, and the bracket supporting the fuel pump control arms re-located.

These changes are made possible by a variety of alternate mounting facings and are intended to increase the accessibility of external components needing servicing.

The six-cyl engine of 742 cu in. piston displacement has received wide acceptance. A supercharged version, developing 190 hp at 1800 rpm, is used in the Vickers VR-180 crawler tractor. As a marine unit, it is given a max rating of 250 hp at 2100 rpm.

Ryerson N. Y. Plant Nears Completion

New building construction at its New York area steel service plant, which will increase capacity about 50 per cent, is nearing completion, according to Joseph T. Ryerson & Son, Inc.

Located on an eight-acre site near the present plant at Jersey City, N. J., the addition consists of two large building units, 110 ft by 605 ft, and 85 ft by 580 ft. Total floor area of the enlarged steel service facilities is about 355,000 sq ft.

REGIONAL SALES OF NEW PASSENGER CARS

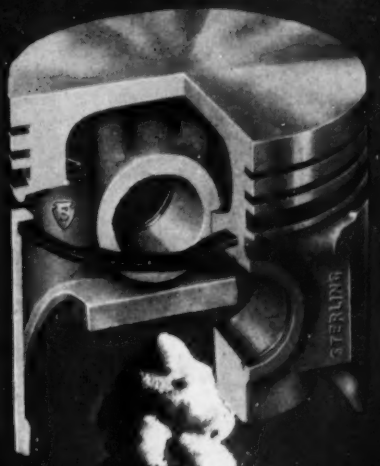
Zone	Region	August 1953	July 1953	August 1952	Eight Months 1953	Eight Months 1952	Per Cent Change: Aug. over July	Per Cent Change: Aug. over Aug. 1952	Per Cent Change: Eight Months 1953 over 1952
1	New England	27,719	31,108	11,379	226,531	185,065	−10.89	+143.60	+46.09
2	Middle Atlantic	100,094	109,534	38,518	753,749	512,685	− 8.62	+159.86	+47.02
3	South Atlantic	55,313	58,883	23,383	441,518	319,039	− 6.06	+136.55	+38.39
4	East North Central	129,607	137,013	58,889	1,026,087	692,784	− 6.14	+118.39	+48.11
5	East South Central	24,377	25,279	9,262	184,544	122,168	− 3.57	+163.19	+51.06
6	West North Central	55,094	55,686	22,450	395,938	267,701	− 1.03	+145.41	+47.90
7	West South Central	46,943	49,153	18,738	356,020	245,982	− 4.50	+150.52	+44.73
8	Mountain	13,792	17,381	9,314	125,732	92,927	−20.65	+ 48.08	+35.30
9	Pacific	80,491	49,756	23,735	406,119	287,646	+ 1.46	+112.73	+41.19
	Total—United States	502,430	533,783	215,668	3,916,238	2,695,997	− 5.87	+132.96	+45.26

States comprising the various regions are:—Zone 1: Conn., Me., Mass., N. H., R. I., Vt.—Zone 2: N. J., N. Y., Pa.—Zone 3: Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4: Ill., Ind., Mich., Ohio, Wis.—Zone 5: Ala., Ky., Miss., Tenn.—Zone 6: Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7: Ark., La., Okla., Tex.—Zone 8: Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9: Cal., Ore., Wash.

NEWER

Than Nuclear Fission !

METERED STEEL REACTOR



Now Allows You To Specify Your Own Piston Clearance!

STERLING

CONFORMATIC PISTONS

...prove that by carrying the strength ...and design of the steel insert we can pre-de...termine piston skirt expansion and contraction ...to meet any engine clearance specification.

CONSTANT CLEARANCE over the entire temperature range from −20° F. to 200° F. Closer clearances than ever before possible without danger of scuffing or seizing.

STERLING ALUMINUM PRODUCTS INC. ST. LOUIS, MISSOURI

Dodge Truck Engines

(*Continued from page 59*)

and 1-ton models on wheelbases ranging 108, 116, and 126 in. Some of the models have rear loading height of less than 24 in., all include numerous improvements. One-ton express models are available with dual rear wheels.

Lower loading heights make stake trucks easier to load and unload, stake and platform bodies being offered in 7½, 9, 12, and 14-ft lengths.

COE models now are provided with a hood divided into two halves with a fixed center panel to permit easy access for servicing.

The new V-8 engines, as given in the tabulation, are similar in design to the now familiar OHV Chrysler Corp. engines. They feature hemispherical combustion chamber design, widespread lateral spacing of valves, and operate satisfactorily on regular service station fuels, despite high compression ratio. The tabulation shows brief mechanical specifications of the three powerplants, together with models on which they are offered.

Although the V-8's are similar to the family of Chrysler Corp. engines in basic design, they incorporate special features which make them particularly suitable for heavy duty service at sustained high speeds. Intake and exhaust valves are of silicon-chromium steel, with valve seat inserts for exhaust valves. Exhaust valves all are sodium-filled with Stellite-facing on exhaust valves and seats. Hydraulic valve tappets are standard.

In addition, engines for models J, K, R, T, and V, have the following special features: valve seat inserts for intake as well as exhaust valves; bronze valve guides for exhaust valves to provide better heat transfer and longer life; positive valve rotators; tri-metal main and connecting rod bearings.

Pistons are of aluminum alloy, of steel-strut construction, and tin-plated. The top piston ring is chromium-plated. Crankshaft journals on all models are surface hardened.

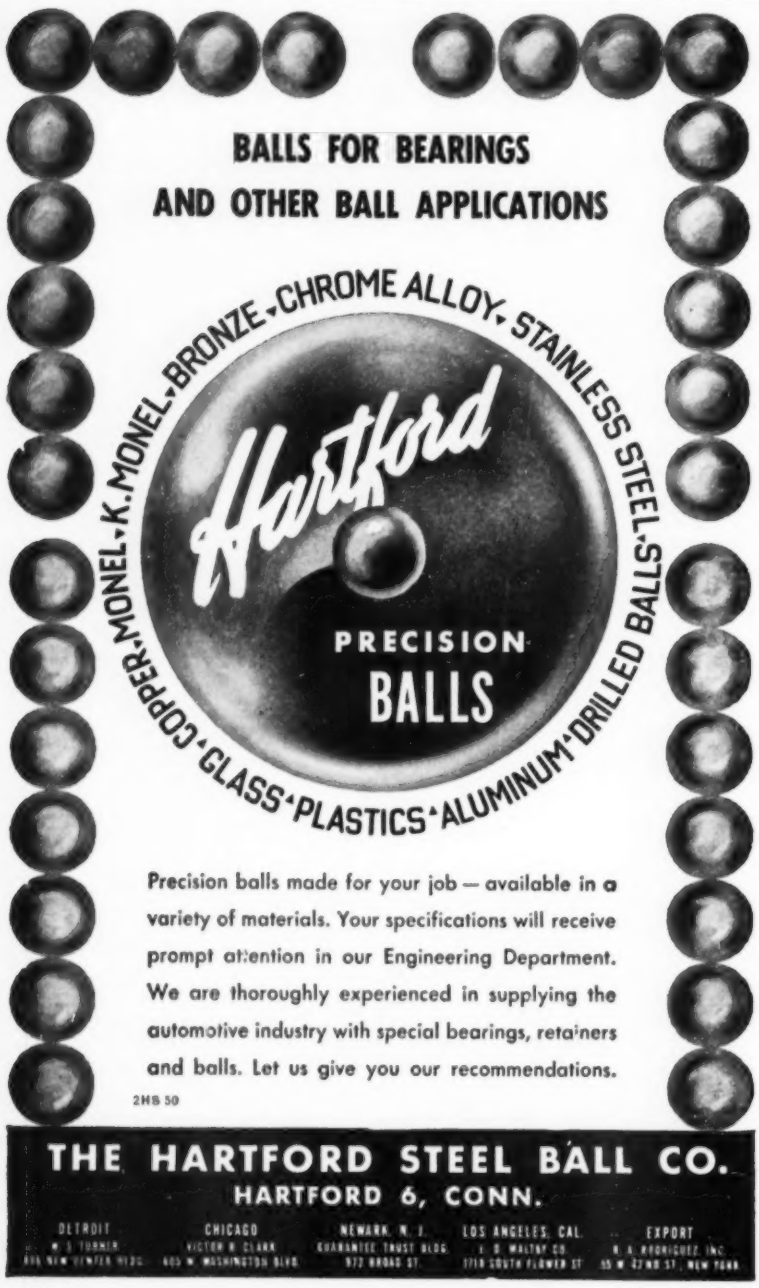
A dual-throat, downdraft carburetor is used on the 133- and 172-hp V-8's; while the 153-hp V-8 is fitted with a single-throat carburetor. Ignition key starting is a feature on all models using the V-8 engines. A double-breaker type distributor is standard on V-8's.

Six-cylinder engines continue the familiar features of Dodge truck design. Scanning the tabular data on mechanical specifications will show an increase in the rating of some models —increases in bhp or torque or both as the case may be. It will be noted that both the 136-hp and 171-hp engines are fitted with twin carburetion to account for increased ratings.

It may be noted that the 171-hp engine used in Y-models is essentially a rugged, heavy duty job, featuring high torque ability. In this respect, its torque rating is higher than that of the larger V-8.

Hydraulic brakes are offered as standard equipment on most Dodge models, except as noted, all high-tonnage models being equipped with vacuum brake booster as well. Full air brakes systems are installed on 2¾, 3, and 4-ton models.

The Truck-O-Matic transmission, combining Gyrol Fluid drive, is offered on all ½- and ¾-ton models. It is a hydraulically-operated transmission with two forward speed ranges, providing four forward speeds plus reverse. In addition, Gyrol Fluid drive, consisting of a fluid coupling inserted in the drive line, is available in all low-tonnage models.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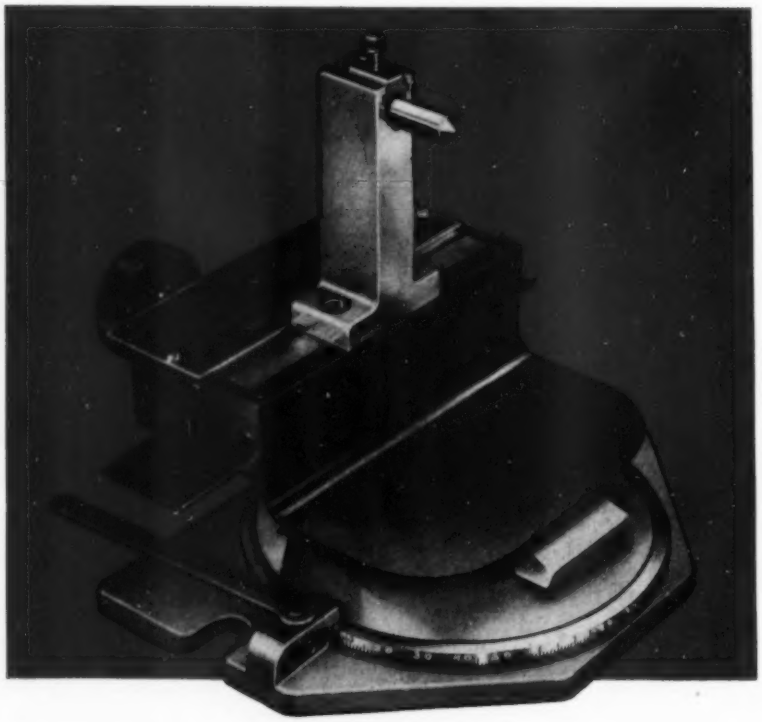

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Corvette Production Techniques

(*Continued from page* 72)

After body assembly the hull is transported to an adjacent spray booth where it is given a prime coat. After this coat is dried the body is moved to another booth for dry sanding. Following this it is given two finish coats of Duco finish. Paint is dried in a conventional oven at a temperature of about 170 F.

Finish painted bodies then are transported to the assembly section where they are trimmed at two stations. Then the body is lifted by the usual body hoist and moved over to the assembly line for installation. Since this is a pilot operation by comparison with Chevrolet assembly methods, the final assembly line consists essentially of just four stations, as illustrated.

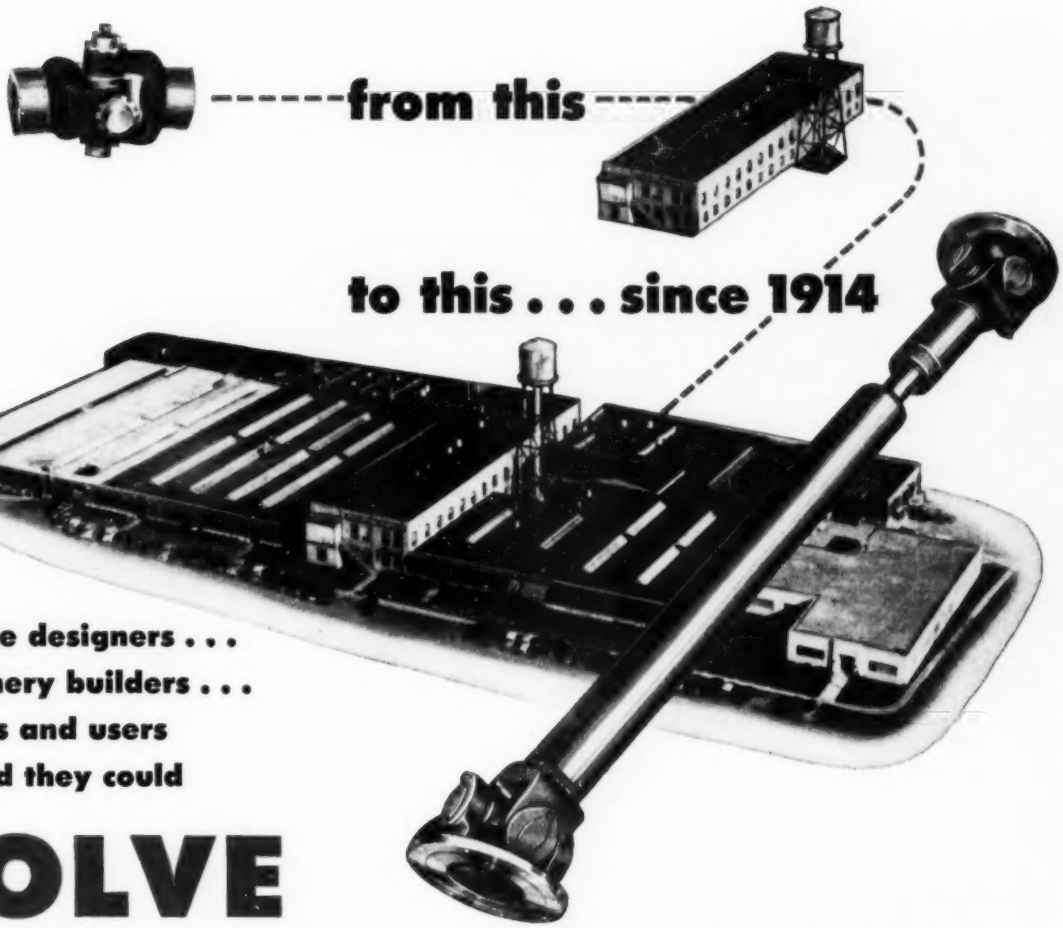
At the present time all molded parts and sections are produced for Chevrolet by a custom molder, using the so-called bag method for molding, with curing under pressure and accelerated by heat. The process begins in a mold with depressed planes and curves precisely duplicating the skin of the finished part. As the initial step the interior surface of the mold is sprayed with a parting agent, followed by application of a resinous gelcoat which dries to a milky white.

Next comes "layup" consisting of three layers of fiber glass mat, the first two layers being coated with a "syrupy" resin compound. A backup mold then is placed over the fiber glass. Pressure on the still moist laminations is exerted by clamping a sheet of polyvinyl plastic over the mold and exhausting the air between the backup mold and sheet. Heat is employed to accelerate the curing process.

When the part has been cured, it is removed from the mold, trimmed and ground to size. Flash at the edges is removed by a band saw. The part then is sanded to achieve finish dimensions as well as surface finish.

Because of the slender and rather shallow body design, torsional rigidity is imparted to the entire structure through a massive and rigid chassis frame of welded, box construction with a heavy, box-section X-frame. To maintain the full strength of the X-frame, the propeller shaft is carried over the frame instead of cutting through the center.

Before the advent of the Corvette,



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dealers and users
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	Maximum Torque Inch Pounds	
	Cont. Load	Hand Oper.
K Series K2R Series	350	2,000
K-1-C	350	5,000
K-2-A	400	2,000
L6S Series L6N Series		

	Recommended Torque Rating, Inch Pounds	Needle Bearings
L10S Series	650	Opt.
1FR Series	1,080	"
L14S Series	1,230	"
3DR Series	1,800	"
L16S Series	2,200	"
L14N Series	4,500	"
35N Series	10,000	"

FOR TRUCKS AND BUSES

N Series	Recommended Torque Rating, Inch Pounds	Balanced for
45N	14,000	3600
5N	20,000	R.P.M.
50N	20,000	Max.
6N	38,000	"
60N	38,000	"
7N	57,000	"
70N	57,000	"
75N	70,000	"

FOR MARINE AND INDUSTRIAL EQUIPMENT

BW Series	Maximum Torque Inch Pounds Cont. Load	Momentary Load
BW-12	1,020	4,450
BW-1	1,695	7,500
BW-2	3,350	11,720
BW-3	4,450	16,800
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BW-5	8,640	34,200
BW-6	11,620	60,000
BW-7	28,600	150,000
BW-9	89,300	500,000

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MOLY

AI-11 MS-3

considerable anxiety was expressed regarding the ability of a plastic body to take impact loading due to traffic hazards. This stemmed primarily from the behavior of commonly known plastics, since little practical information had been available on reinforced plastics. Judging by the experience gained so far, Chevrolet claims that the glass-plastic body is more resistant to impact than is a comparable steel body. A blow that would dent steel bounces harmlessly off the plastic. Moreover, damage is localized and a blow sufficient to do damage will either cause a crack or a break.

One of the explanations for this behavior is that although the modulus of elasticity of reinforced plastic is considerably lower than that of steel, the outer panel sections are molded 0.10 in. thick as compared with the much lighter gages of sheet steel normally employed. This greater thickness is instrumental in producing higher tensile properties than for steel.

It is of interest that cracks or breaks can be readily and quickly repaired or complete sections or panels replaced without employing highly skilled labor. After the repair has been completed, the repaired area is polished, then painted in the usual manner.

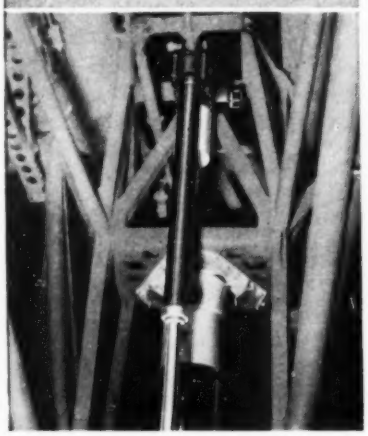
BOOKS . . .

THE INERT-GAS-SHIELDED METAL ARC WELDING PROCESS, *by W. H. Wooding, published by American Welding Society, 29 W. 39th St., New York 18, N. Y. Price, $1.00.* Covered in this pamphlet are the fundamentals of the inert-gas-shielded metal arc welding process. With the aid of sketches and photographs, the author portrays the development of the process, the equipment required, the necessary controls and their function. Special sections are devoted to the operation of the equipment from the operator's viewpoint as well as that of the supervisor and the engineer. The safety precautions necessary for protection of the operator are also included.

PRESSURE - VISCOSITY REPORT, *published by The American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y. Price, $10.00.* Recent experimental work has resulted in comprehensive data on the viscosity and density of more than forty lubricating fluids at temperatures from 32 to 425 F and at pressures up to 150,000 psi. It is considered that the data presented in this report will be of value for many years and will be subjected to many analyses in connection with lubrication problems; methods of expressing the variation of viscosity and density with pressure and temperature and in correlation of these properties with the composition of lubricating fluids.

ZP2K LANDING GEAR

Airborne Actuated



The landing gear in Goodyear's ZP2K Navy blimp is actuated by Airborne's R-534M1 LINEATOR with a 12½ in. stroke. Airborne electromechanical actuators are specified by Goodyear — and most other manufacturers of military aircraft — for two reasons: they provide high power output in a minimum of space, and they can be counted on, however rugged the conditions.

Dimensions and data on Airborne products for the aviation industry are given in the I.A.S. Aeronautical Engineering Catalog.

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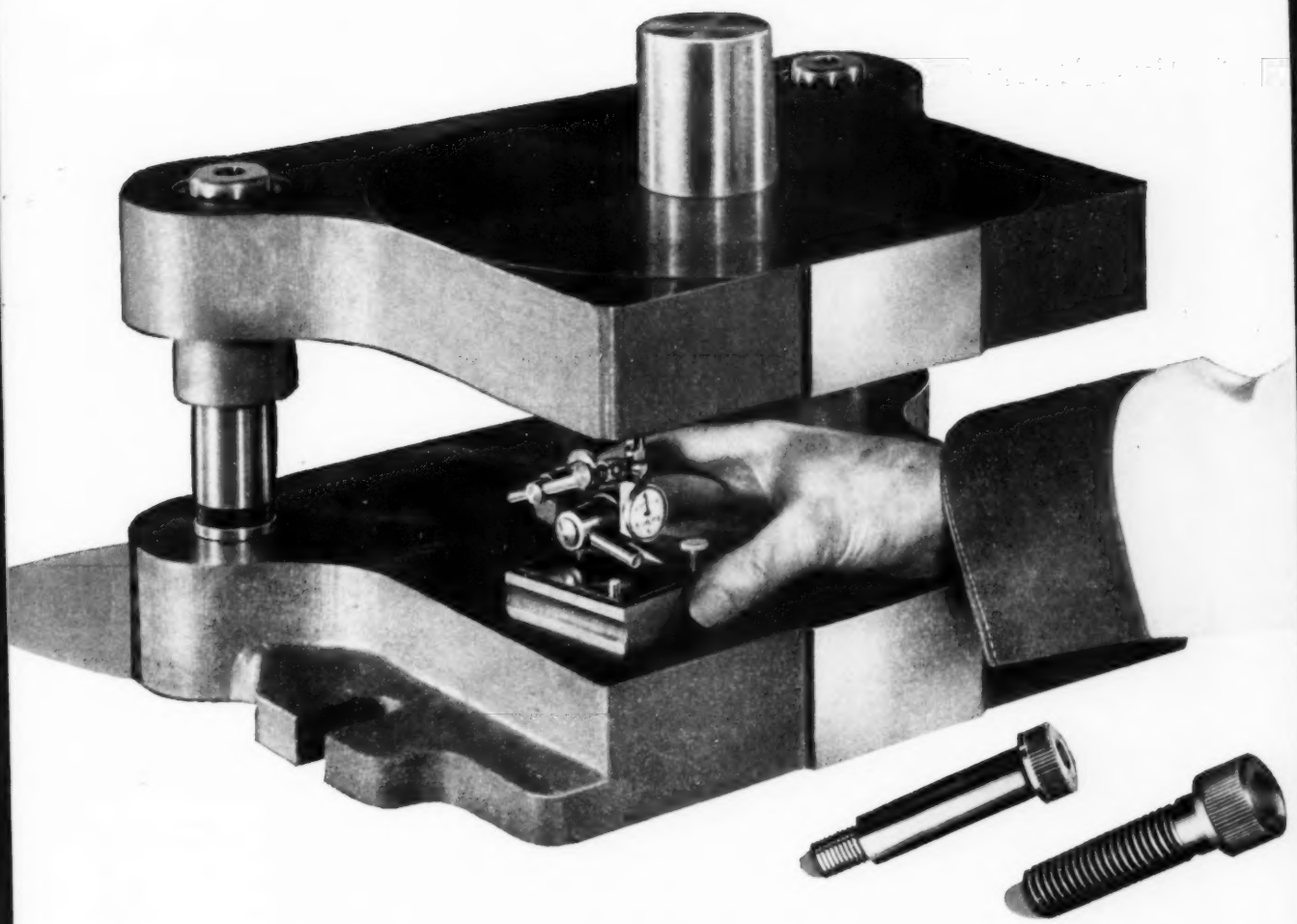

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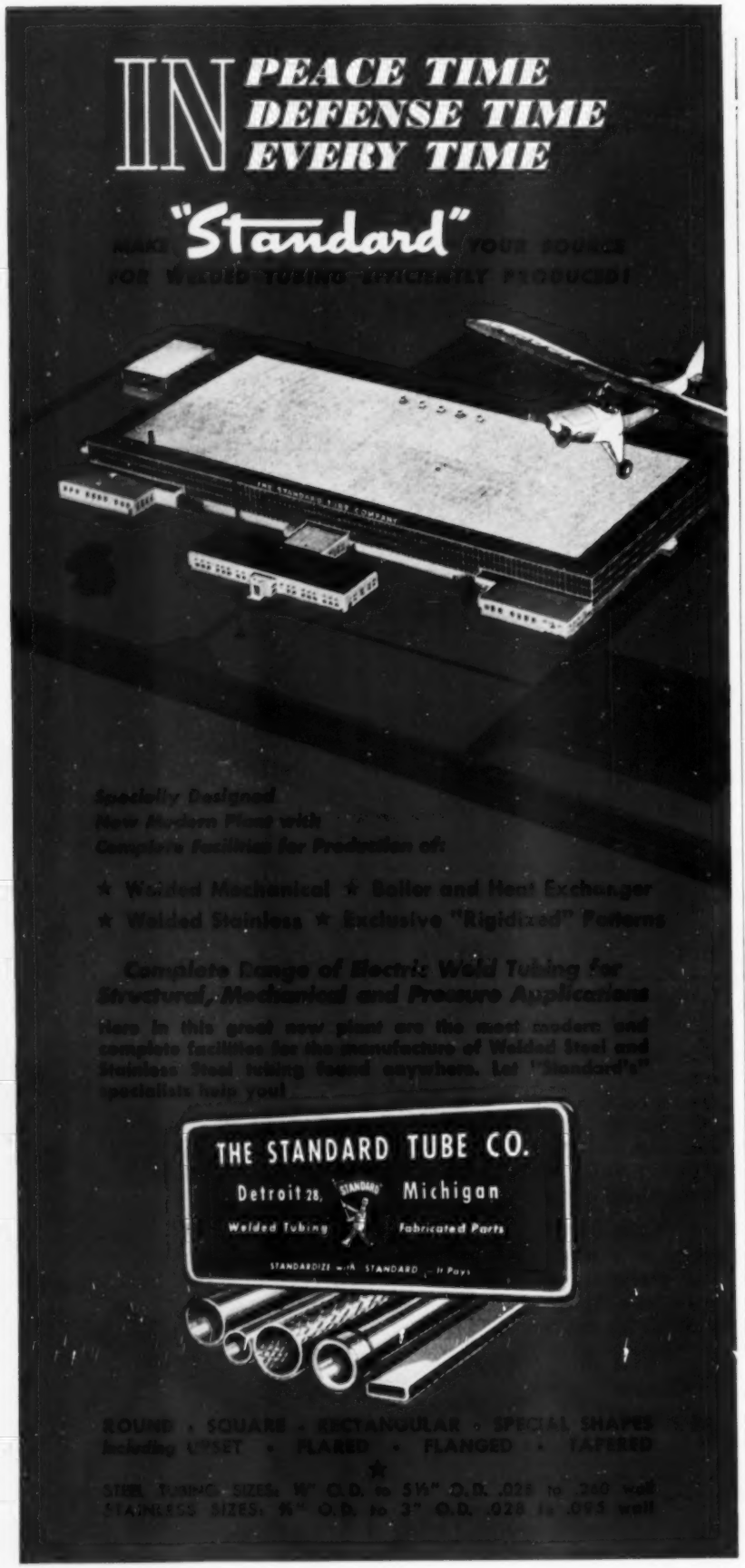

Tomorrow's Airplanes

(*Continued from page* 52)

Materials lose strength at high speed temperatures, so high speed airplanes must be very heavy. No known powerplant can push this heavy weight through the air; therefore, high speeds are made unavailable to us by a "temperature barrier." Again, I am sure, the same thing will happen. The metallurgists will develop materials with more hot strength, the powerplant designers will provide more thrust, and the 'thermal barrier' will be shown to be non-existent."

The biggest problem in the future may possibly be associated with increased endurance at our present temperatures in the 250-750 F range rather than associated with raising peak transient high speed temperatures to 1000 F or higher. A missile that flies once at 1000 F for two seconds presents less of a problem than a transport flying at 300 F for eight hours every day.

A. M. Mayo, in "Taking Man To Higher Altitude," outlined what probably was the longest list of engineering problems, although some of them were concerned more with human beings, their slow reactions and their inabilities to withstand extremes of heat, cold, and altitude. The Douglas Aircraft Co., El Segundo Plant chief of equipment and interiors, engineering section, indicated that present air-conditioning, refrigerating, and cabin-pressurizing systems won't work at altitudes above 70,000 ft. Hermetically-sealed cabins, with pressure suits for emergencies, probably are necessary.

While supersonic aircraft actually outrun the external noises they make, internal noise-suppression is mandatory. Human beings are so slow in their reactions that control systems, including visual aids, will have to be developed to take over the operating details. The humans will decide only when and where to go.

Missiles of the V-2 type used during World War II, as well as the rockets since developed, make hopelessly inefficient use of fuel, J. W. Luecht, Chrysler Corp., reported. He proposed the development of air-breathing propulsion, specifically the installation of engines of the ramjet type in which the available thrust is a function of ambient density and flight velocity, instead of being rela-

packaging news... by HARCORD

Mechanics all over the country recommend and use Permatex Radiator Cement because of its quality performance. Attention to detail and quality production of these paper canisters have played a big part in our relationship with the Permatex Company.

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Here is an unusual paper canister for a double duty product, Permatex Cooling System Cleanser and Radiator Rust Preventor. Openings at both ends and an interior partition serve a practical and functional purpose. We're proud to be of service to a company so aware of smart merchandising.

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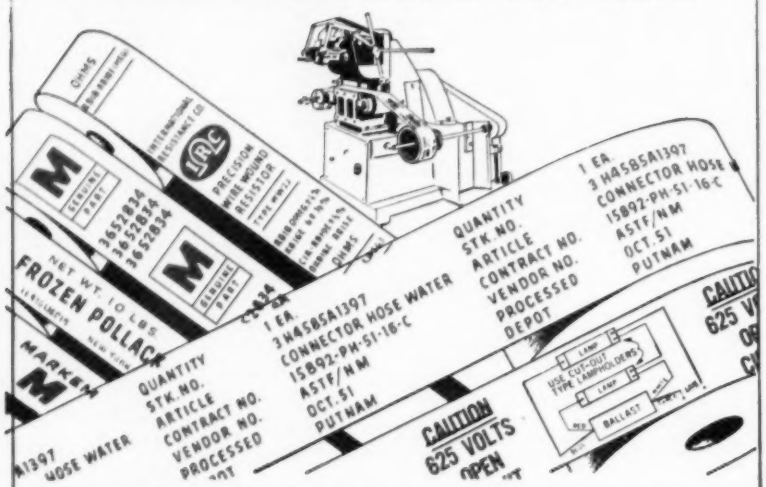

The introduction of pressure sensitive tape for industrial uses offered many advantages if *label* data could be printed on the tape *in the plant itself when needed*. Markem developed methods that permit printing of stock number, part number, trade mark or other designation on this tape. Label inventory problems are thus eliminated. Manufacturers can now print the exact number of labels required . . . readily changing variable information or color of ink when desired. The Markem method used includes a Markem machine which makes up to 85 imprints per minute, rewinds the roll of tape automatically, and shuts itself off after a selected number of imprints. Thus Markem has provided industries of all types with a more modern, more attractive and less expensive means of labeling.

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CAN MARKEM HELP YOU? Printing labels on pressure sensitive tape is but an example of how Markem solves industry's marking problems. Markem has been providing industry with production techniques and equipment to identify, decorate or designate its products, parts and packages since 1911. Markem also provides technically trained men who are available in your area to assure *continued* satisfaction with Markem methods and equipment.

When *you* have a marking problem, tell us about it and send a sample of the item to be marked. Perhaps a complete Markem method has already been developed to solve your problem. If not, Markem will work out a practical solution.

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MARKEM ... TO MAKE YOUR MARK

tively constant, as with the rocket.

Simplification of aircraft fuel systems was recommended by R. R. Higginbotham and W. R. Petersen, Republic Aviation Corp., Farmingdale, Long Island, N. Y., who described the complexities in large part to excessive and unnecessary performance requirements. They proposed that simplification be achieved by eliminating such requirements as filter de-icing, emergency fuel systems, and one minute inverted flight.

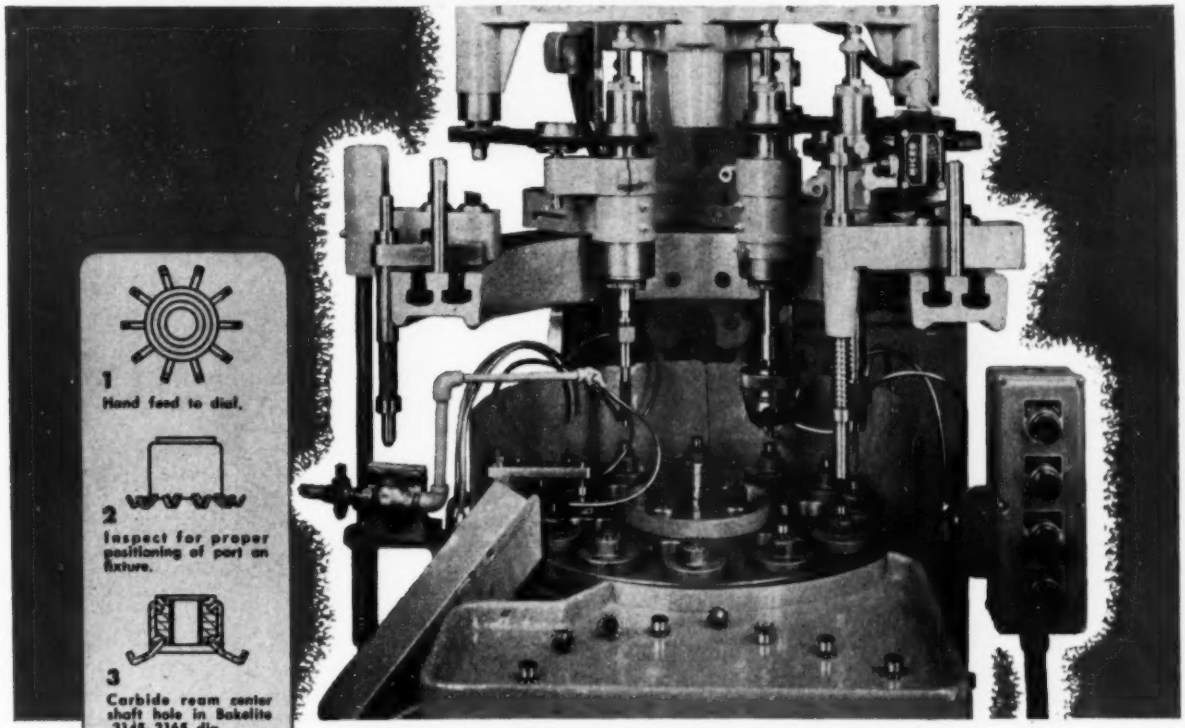
Aircraft can depend no longer upon outside air to cool their equipment. At the speeds modern planes travel, the air is too hot, according to Doyle C. Wells, electronics engineer, Ryan Aeronautical Co., San Diego, Calif. He said the industry is meeting the problem both by building equipment to withstand higher temperatures and by installing refrigeration. He added there is little hope of building electronic equipment for high-temperature use, and refrigeration must be utilized, although consideration is being given to using the fuel as a heat-exchanger.

"In the future," he warned, "when aircraft speeds progress well past the trans-sonic, and when altitudes of 15 miles are commonplace, not only electronic equipment but hydraulic and rotating electrical machinery will also have to be cooled by means other than air. It would appear that fuel would be the best choice for an integrated aircraft cooling system heat sink, although liquid evaporation will find its place for small insolated pieces of equipment."

Services rendered by flight-test instrumentation in the development of new aircraft, especially military planes, were evaluated by W. Lavern Howland, Lockheed Aircraft Corp., Burbank, Calif., as effecting large savings in time and cost. He said the new type planes with their improved performance necessitate the development of test instruments of far greater precision and accuracy, reliability, and flexibility.

"A few years ago," he added, "measurements to an accuracy of two per cent were adequate for most purposes. Now, on a number of quantities, accuracy on the order of 0.2 per cent is needed, and there appears to be no end in sight in the increase in accuracy required on some quantities." Howland explained that in measuring the revolutions per minute of a jet engine, an accuracy of one per cent might mask a significant change in thrust, which varies as much as eight

Bodine CASE HISTORY NO. 36



1
Hand feed to dial.
2
Inspect for proper positioning of part in fixture.
3
Carbide ream center shaft hole in Bakelite .3145-.3165 dia.
4
Carbide hollow mill on O.D. .691-.693 dia., using pilated hollow mill.
5
Carbide face Bakelite shoulder piloting in reamed hole.
6
Automatically eject.

PROCESSING A COMMUTATOR FOR A SMALL ELECTRIC MOTOR (Copper, molded in Bakelite)

FEATURING . . .

Carbide tools to (1) maintain high production speeds and longer tool life in extremely abrasive materials; (2) maintain close tolerances on machining operations.

PRODUCTION:

1070 pieces per hour at 85% efficiency. Machine used is the Bodine Model 41-20 tooled as a straight driller. This model can be tooled for drilling, tapping, milling, single or double screw inserting, and assembly operations . . . or any grouping desired. If you require high speed production at low costs, this is your machine.

"You Can't Meet Tomorrow's Competition With Yesterday's Machine Tools"

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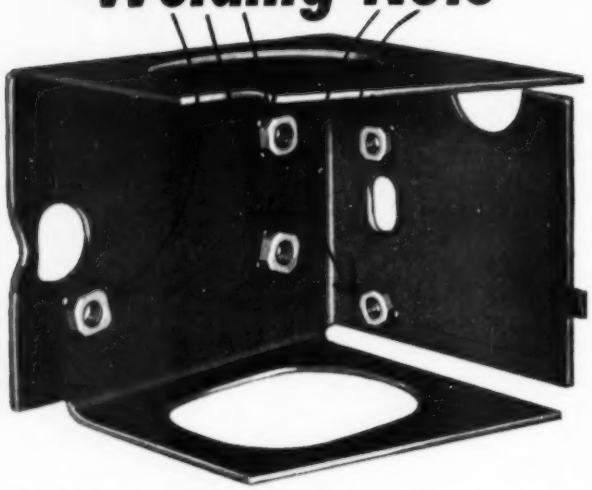
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

3BD53

IMAGINE TRYING TO GET IN HERE TO HOLD NUTS!

No Problem At All With . . .

MIDLAND
Welding Nuts



With Midland Welding Nuts pre-mounted* in inaccessible places, there is no need to hold the nuts while attaching other parts.

*THIS IS ALL YOU DO — Just insert collar of Midland Welding Nut in hole for bolt or screw, resistance weld the Nut in place, and the Nut is there for the life of the job. Nuts can be fed automatically to the resistance welder.

Write for facts about these better connections at less cost.

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to ten times the percentage change in revolutions.

"Holding the Reins on 300,000 Hp," by J. C. Wise, Marquardt Aircraft Co., Van Nuys, Calif., explored the possibilities of 300,000-hp ramjet engines designed to propel a pilotless target-finding missile to altitudes of 80,000 ft or more. In order to remain within security limitations and yet set a few physical boundaries on the area a ramjet control designer must consider, a hypothetical missile powered by a fictitious engine was used. The matter of control, Wise said, creates a real and difficult problem applicable to existing engines, and a challenge to engineering which the tremendous power possibilities of ramjets justify accepting.

Small gas turbines were characterized by Homer J. Wood, assistant chief engineer, AiResearch Mfg. Co., Los Angeles, as those below 500 hp. Wood said the development of turbines large and small comprises the evolution of a new prime mover awaited with some eagerness by a public willing to replace reciprocating engines.

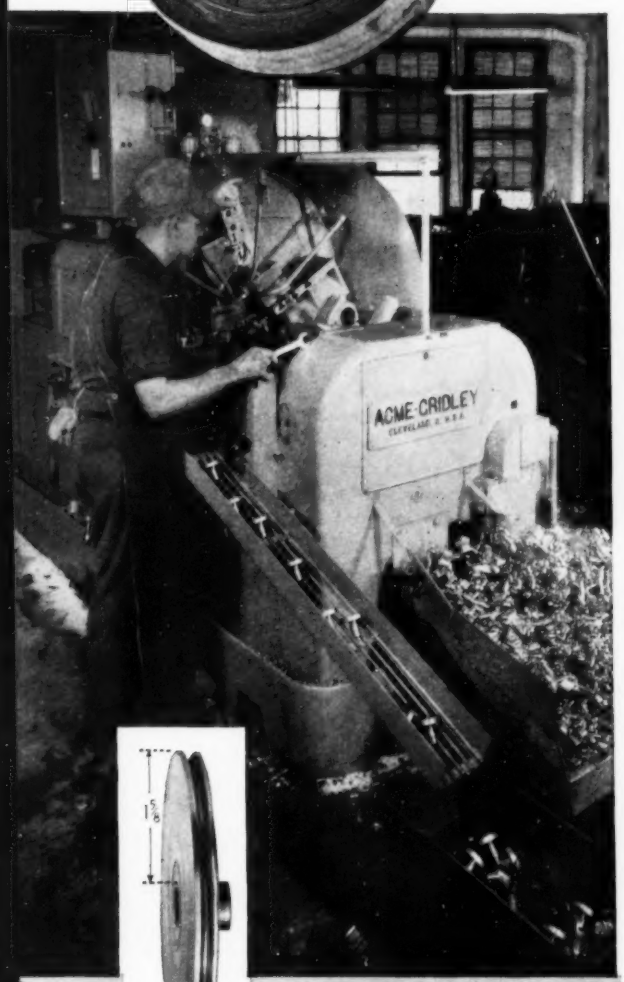
"Small gas turbines are many years from being in a position to supplant piston engines in any major markets," he commented, "but there are certain fields where they already have demonstrated their practical usefulness and may be said to have come of age. To some extent small gas turbines have created their own market rather than replacing piston engines in existing fields. It seems probable that the next few years will see a gradual expansion in this direction rather than a general encroachment upon major piston engine markets."

Gas turbines currently cost more than piston engines, Wood went on, and are not as reliable under field conditions. They demand higher maintenance costs, but do have the advantage of low weight per horsepower, can operate in low temperatures, and occupy far less space. He added that the turbines are finding a field of service in aircraft auxiliary power; may next be used in helicopters; and ultimately will be found superior for long-time, steady-load applications where their freedom from vibration and ease of maintenance will enable them to provide thousands of hours of trouble-free operation.

George A. Lemke, design specialist, Consolidated Vultee Aircraft Corp., San Diego, Calif., said it is becoming increasingly necessary both to pressurize and cool fighter aircraft

(*Turn to page* 116, *please*)

YOU CAN SAVE—plenty



You'll say it's better machining practice to break up chips and right you are. This one, 58 ft. long, on difficult material, to the full depth of a deep forming cut, was made during the set up. It serves to demonstrate a new kind of machine *stability and performance* which forward looking buyers demand and get in the—

New Model "M"

ACME-GRIDLEY

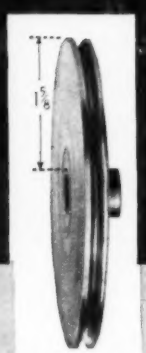
Single Spindle Bar Automatic

In short, it demonstrates important design and construction features such as frame weight and balance, heavy slides, powerful uniform cam feeds that minimize vibration and increase tool life even at fastest feeds and speeds that modern carbide tools can take—all of which guarantees sustained accuracy, long machine life, lower costs.

Other Acme-Gridley features that promote adaptability and speed on all classes of work—

★ *Eight independently operated tool slides*
★ *Three automatically selective spindle speed ranges*
★ *Independent turret indexing permits overlapping operations*
★ *Accessible tools and camming—easy operation, quick change-over on short runs. One man runs 2 or more machines*
★ *Time cycle for job is fully automatic—production schedules can be predetermined and met—saving plenty!*

Ask for Bulletin M-50A



JOB FACTS

PIECE: Motor Valve Plate
SIZE: 3 7/16" diam.
MATERIAL: E 52100 Ball Bearing Steel
HIGH SPEED TOOLS: 13 are used including trepaning face and drilling hub
MACHINE TIME: 17 min. 50 sec.
MACHINE: 5 1/4" Acme-Gridley Single Spindle Bar Automatic

Remember—**Industry can't do TODAY'S JOB with YESTERDAY'S TOOLS and be in business TOMORROW**

The NATIONAL ACME COMPANY

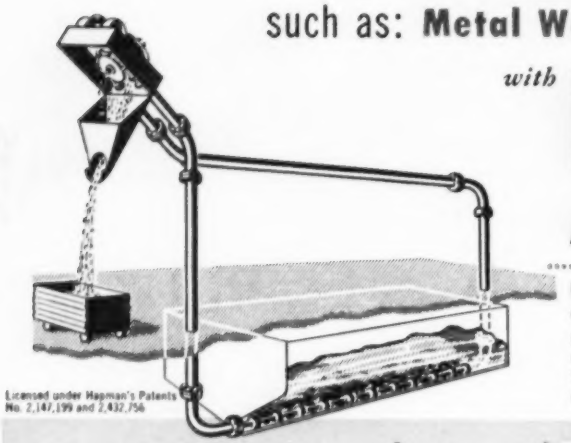
170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics, 1-4-6 and 8 Spindle —Hydraulic Thread Rolling Machines—Automatic Threading Dies and Taps—Limit, Motor Starter and Control Station Switches—Solenoids—Contract Manufacturing.

Get automatic LOW COST handling of loose materials such as: **Metal Working Chips • Dust • Scale • etc.**

with

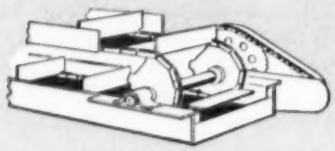
HOUDAILLE
Automatic Conveyors



Licensed under Hapman's Patents No. 2,147,199 and 2,432,756

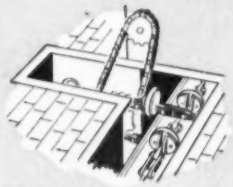
Houdaille Chain Drag Conveyors

Completely enclosed flights and chain automatically collect, transport and discharge chips, sludge, scale and other types of solid or fibrous material which settle to the bottom of tanks or hoppers. Standard pipe sizes — 3", 4", 6", 8". Larger sizes on request. Choice of chains, flights, casings, accessories also available.



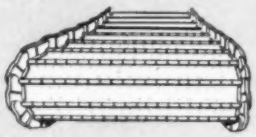
Houdaille Slat Type Conveyors

Slat type trough conveyors, operating individually or in sequence, transport material to any given point—can be operated continuously or intermittently as desired. Slats and chain move material in open troughs, return automatically to collection or transfer points.



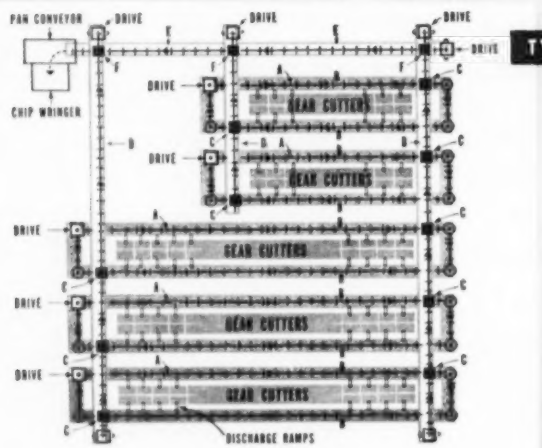
Houdaille Open Trough Conveyors

Chain Drag Conveyors installed in open troughs, running above or below floor level, offer many advantages in different types of operations. Below-floor-level installation, illustrated, continuously removes steel chips from machine tools, keeps system from interfering with heavy traffic plant areas . . . yet offers access to chain and flights at any point of circuit.



Houdaille Pan Type Conveyors

One-piece, heavy-gauge steel plates, featuring all-welded hinge construction, lock together firmly by means of connecting rod to form perfect pan-type conveyor for chips. Welded hinges, rod connections and side wings, securely interlocked even when chain negotiates sprocket or turns, prevent fall-through of material or jamming of conveyor. Plates perforated for drainage, depending on application. Ideal for installation on individual machines or large central chip handling systems.

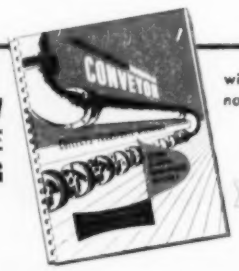


TYPICAL OPEN TROUGH CHAIN CONVEYOR LAYOUT

Nine 6" Houdaille Open Trough Chain Conveyors operate automatically and continuously to remove steel chips from 500 Gleason Gear Cutters in large automotive plant. Five of the conveyors (A) pick up steel chips deposited into troughs (B) by the gear cutters. Each of the five conveyors services a battery of gear cutters aligned in a double row. Trenches, accommodating the open trough conveyors, wind completely around each double row of gear cutters up one side and down another. Chips empty into the troughs by means of a discharge ramp extending from each gear cutting machine.

Each of the five conveyors discharges chips at two points on their individual circuits (C). Here, three other 6" open trough chain conveyors (D), operating over and under the first five conveyors, collect, transport and ultimately discharge all of the chips into one main 6" open trough chain conveyor (E) at three points (F). At these points the chips are carried along the trough to a pan conveyor which discharges regularly into a chip wringer

NEW COMPREHENSIVE CATALOG



with complete information on all Houdaille conveyors is now available. Write today on company letterhead to...

Honan-Crane Corporation
404 MADISON AVENUE, LEBANON, INDIANA
a subsidiary of **Houdaille-Hershey Corp.**

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New Automotive Uses For Silicones

RECENT developments in the Dow Corning laboratories and in the field have extended useful applications of the gamut of silicone formulations considerably beyond original expectations. Many of the new ideas now in the laboratory stage will be doing useful work in automobiles and other automotive products within a short space of time.

One of the most significant is the commercial development of heat and weather resistant paints, lacquers, and enamels. Formulated with silicone or modified silicone resins and aluminum flake, powdered zinc or a wide variety of heat-stable pigments, these coatings are used to protect metal parts subjected to intense heat. The exhaust manifold of one of the new passenger car V-8's has been coated with this type of material for several seasons, retaining its fresh painted look despite long periods of engine operation.

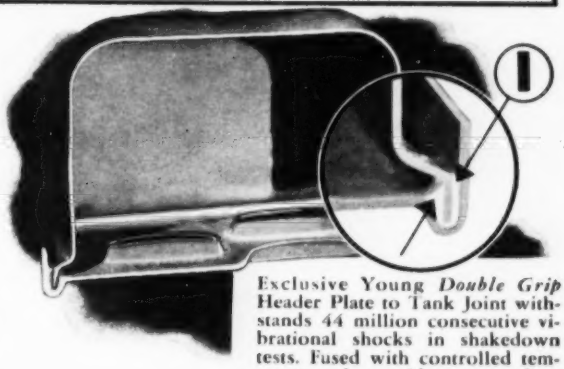
Recent introduction of rather expensive convertibles and sport cars fitted with wire wheels has focused attention upon the finish of brake drums. If these vehicles are to retain their good looks for a long time, it appears particularly desirable to have a protective coating on brake drums. Several makes have adopted a silicone-base finish which is heat-stable and retains its color for long periods of time.

An aluminum paint formulated with silicone resins is said to form a heat-stable and corrosion resistant coating for mufflers and tail pipes. Such parts are effectively protected against corrosion due to road splash and salt. One of the heavy duty truck builders is coating the external, vertically mounted muffler and stack to preserve their appearance. A major manufacturer of motorcycles has been using an aluminum pigmented, modified silicone coating on motorcycle cylinders.

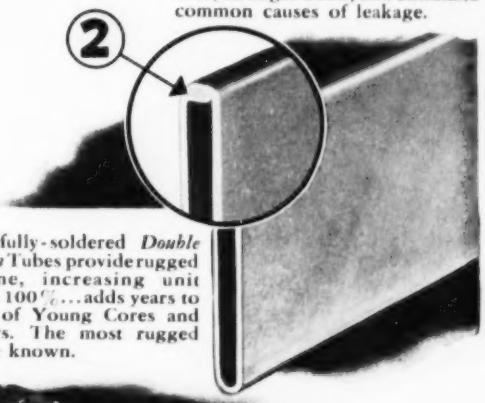
It is probable that a number of 1954 automobiles will be able to offer the public more colorful and more practical upholstery fabrics treated with a silicone water repellent. Millions of yards of suiting woven of synthetic fiber or mixed synthetic and natural fiber have been silicone treated for the garment industry. Several large mills are now offering silicone treated upholstery fabrics to the automobile industry.

Silicone treated fabrics have a finer "feel" and they are slippery enough to facilitate sliding in and out of car seats. Not only are they unaffected by water, they are easy to clean since most spots can be removed with water, and cleaners are less likely to leave a ring. Such upholstery is therefore more readily and more effectively cleaned on the production line, thus opening a new area for economy in the trim shop. In addition, these fabrics are said to have greatly increased resistance to abrasion. In short, they offer an

3 POINTS to Specify...Watch... When Buying Radiators



Exclusive Young *Double Grip* Header Plate to Tank Joint withstands 44 million consecutive vibrational shocks in shakedown tests. Fused with controlled temperature hot solder to produce sure, stronger bond, and eliminate common causes of leakage.



Young fully-soldered *Double Lockseam* Tubes provide rugged backbone, increasing unit strength 100%...adds years to the life of Young Cores and Radiators. The most rugged structure known.

Accurately flanged tube openings in Young fins assure positive joining and maximum heat transfer at all times between primary tube and secondary fin surfaces. Specially corrugated fins increase and control air turbulance and cooling effect.

YOUNG RADIATOR COMPANY

Dept. 103-L, Racine, Wisconsin
Plants at Racine, Wisconsin and Mattoon, Illinois

YOUNG

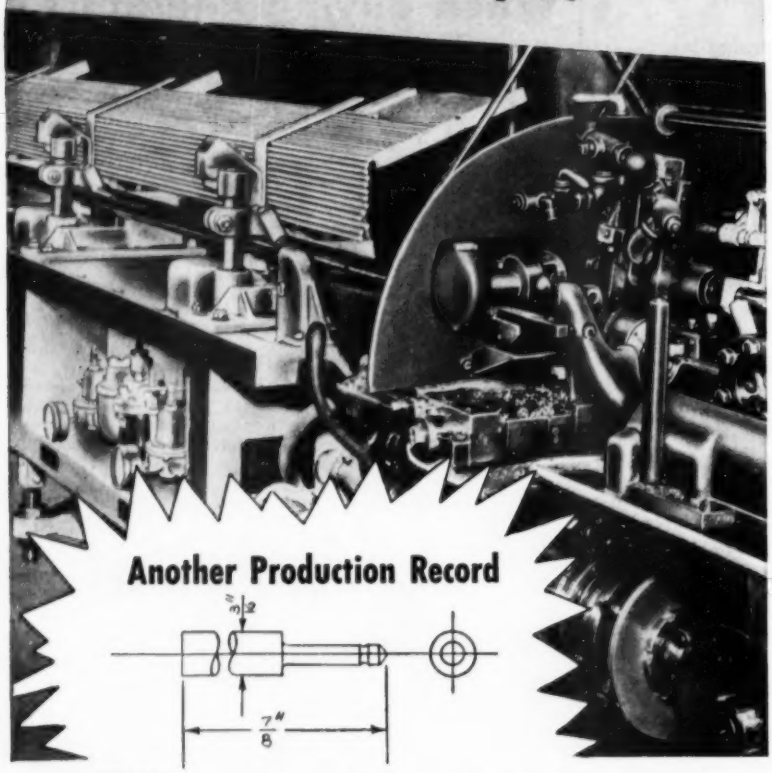
Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Applications

Heating, Cooling, Air Conditioning Products for Home and Industry

Leaders in Heat Transfer Engineering for more than 25 years

Lipe Automatic Magazine-Loading BAR FEED

Increases Production 78% ...Eliminates Helper



THE JOB— One operator attended four screw machines. One of these machines made the part shown above. Average production: 9,000 pieces per 10-hour day. To avoid "cutting air" and to step-up production, a helper was employed to assist operator to keep all four machines loaded. With the extra man, output was raised to approximately 12,000 pieces per day on the unit assigned to this particular job.

THE IMPROVEMENT— Lipe Automatic Magazine Loading Bar Feed was installed on this one machine. Then, operator was able to attend all four units . . . no helper any longer necessary! And the Lipe-equipped machine averaged *16,000 pieces per day* — 78% more than original output!

THE LESSON— Lipe Automatic Bar Feeds *greatly increase production — even over closely supervised, hand-loading methods.*

BIG Production Gains on a wide variety of work, BECAUSE—

- Stock is fed to screw machine all the time—not dependent on operator.
- Pressure constantly behind stock.
- Eliminates feed fingers.
- Avoids multiple feed finger feed-outs.
- Model AML gives maximum output of machine—no "cutting air".
- Saves in changeover set-up time.

Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers will gladly study your problem . . . no obligation.

LIPE ROLLWAY

Lipe - ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

Syracuse 1, N. Y.

unusual appeal to the car buyer.

Another use for water repellent silicone treatment is on the new "Orlon" top materials for convertibles and sports cars. It is said to make the top water repellent and stain resistant, easier to keep clean, and more resistant to abrasion and weathering.

More general use is expected of "Silastic" spark plug boots that stay flexible and remain water repellent and nonconductive to assure easy starting of the engines in wet weather. Silastic lead wire now used in the ignition system of ordnance vehicles may be adopted for trucks and high quality cars. Silastic O-rings now used to seal Chrysler's hydraulic coupling units suggest other automotive applications for gaskets and seals that will withstand hot oil and engine temperature as they do so successfully now in aircraft engines.

Still in the experimental stages are: a silicone adhesive for pressure-sensitive tapes that are serviceable at both high and low temperatures; a silicone product that prolongs the life and eliminates the squeaking of weatherstripping around doors, trunk lids, etc.

In the field of the expanding foundry technique of shell molding, the company has developed silicone release agents which form a clean parting surface between the pattern and mold, thus producing better and cleaner castings with fidelity of detail.

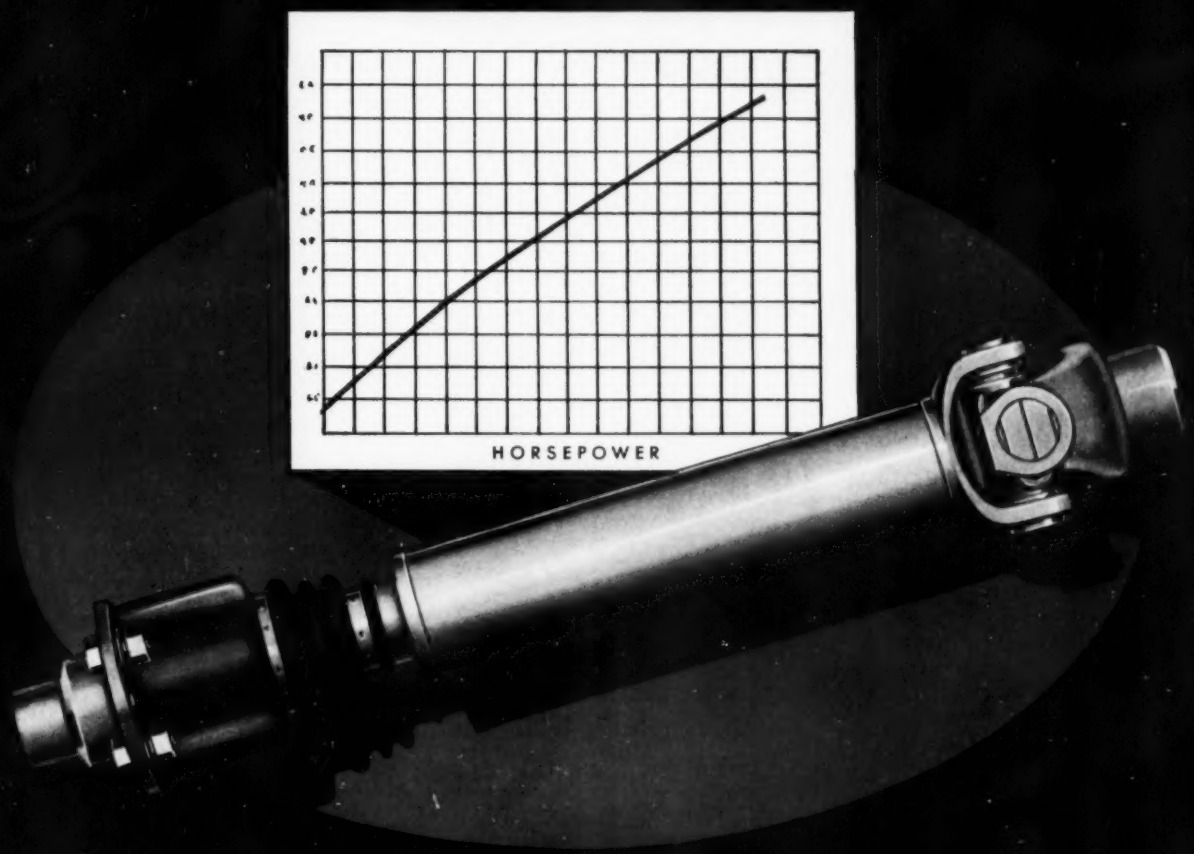
To meet the growing market for silicone fluids, compounds, lubricants, resins, varnishes and rubbery solids, Dow Corning has greatly expanded its manufacturing facilities. Included are the largest silicone rubber plant in the world, the only plant in this country for producing "silica soot" and an electric furnace to produce 95 per cent pure silicon. Installed in a towering three-story structure, this melting furnace has a rating of 6000-kva. By producing its own elemental silicon and the silica used as a filler for silicone rubber, the company will become a more completely self-sufficient operation.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of Automotive and Aviation

MANUFACTURING

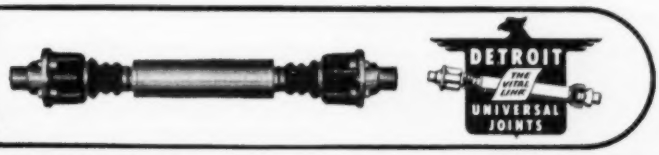
Today's Competition for Horsepower...



...Puts Universal Joints on the Spot

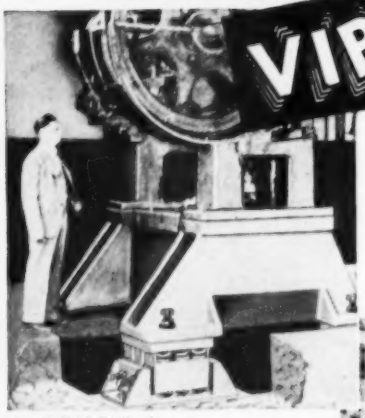
Car engineers are doing a great job of stepping up the horsepower of today's engines. But every bit of new power puts added strain on universal joints. That's why the extra quality built into "DETROIT" Universal Joints is so important—they're built for today's high torque engines.

DETROIT
UNIVERSAL JOINTS

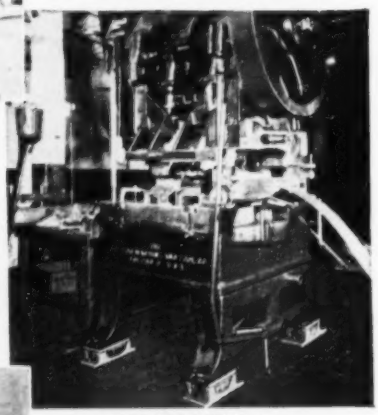


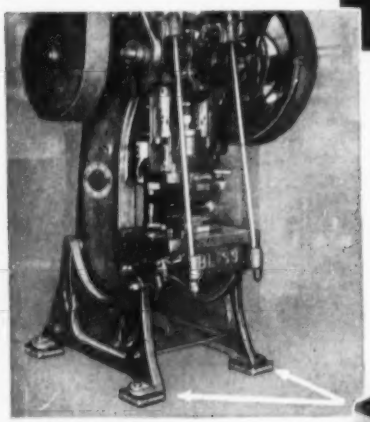
UNIVERSAL PRODUCTS COMPANY, Inc., Dearborn, Michigan

STOP VIBRATION *with* KORFUND VIBRATION CONTROL

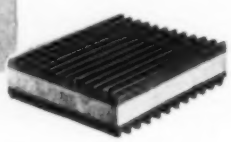


A TOUGH PROBLEM solved by specially designed Korfund Steel Spring Vibro-Isolators. Shock from this 100,000# 600 ton capacity press was cracking building walls. Four specially designed 25,000# capacity Korfund Steel Spring Vibro-Isolators, themselves weighing 600# each, were installed under the press. Building damage stopped and heavy production schedules were maintained. Yet, the price of the special Korfund Isolators was less than 3% of the press cost.





AN AVERAGE PROBLEM—typical of those solved every day by Standard Korfund Steel Spring Vibro-Isolators. Vibration and noise from this double crank press, which could be felt and heard throughout the building, were stopped by Standard Korfund Steel Spring Vibro-Isolators. More and more manufacturers are discovering how Korfund Vibro-Isolators permit press installation without reinforcement of floors, permit press installation *anywhere* (even near precision equipment) for better plant layout, increase press speed and production, improve quality.



A SIMPLE PROBLEM solved inexpensively and effectively by Korfund Elasto-Rib Pads. In this case, Elasto-Rib Pads installed under each of the legs of this press stopped transmission of vibration and noise. For the less critical installation, Korfund Elasto-Rib Pads provide low-cost, effective vibration and noise control, and eliminate bolting to the floor.

PUNCH PRESSES are notorious for the amount of vibration and noise they transmit—yet in the three cases illustrated, Korfund Vibration Control units successfully solved the problem. In our files are scores of case histories describing equally satisfactory installations on many other types of machinery.

A selector chart is available giving recommendations for various vibration control problems. Write for your copy of Bulletin No. 13, or see our catalog in Sweet's Files.

For specific recommendations, contact us or the Korfund representative you'll find in most principal cities. A half-century of experience is at your disposal.

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

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In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

Tomorrow's Airplanes

(*Continued from page* 110)

cabins, but with minimum penalty to performance. He proposed cooling electronic equipment with ram air cooled in turn by water evaporation when temperatures exceed 100 F, equipping the pilot with a ventilated pressure suit which would insulate him against external temperatures, and maintaining cockpit pressurization by discharge air from the pilot's pressure suit.

Robert E. Gorton and Bruce E. Miller, instrument engineers, Pratt and Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn., received the SAE's Manly Memorial Award for their 1952 paper, "Instrumentation for Aircraft Gas Turbine Development." In it, they described special devices for measuring angular velocity, shaft runout, blade clearance, vibration frequency and amplitude, blade and disk temperatures and pressures, combustion gas components, and other variables.

Thirty-two companies exhibited their wares at the engineering display: Aeroproducts-Allison Division, General Motors Corp., Titeflex, Inc., The Cleveland Pneumatic Tool Co., Vickers, Inc., Encyclopaedia Britannica, Inc., The Franklin C. Wolfe Co., Inc., Western Gear Works, Pacific Scientific Co., Hi-Shear Rivet Tool Co., Rosan, Inc., Resistoflex Corp., New York Air Brake Co., Lear, Inc., General Controls Co., Stratos Division, Fairchild Engine & Airplane Corp., Solar Aircraft Co., Lord Manufacturing Co., Aeroquip Corp., Ryan Aeronautical Co., Sun Electric Corp., C & H Supply Co., United States Steel Corp., Hamilton Standard Division, United Aircraft, Red Bank Division, Bendix Aviation Corp., Suprenant Manufacturing Co. (Airsupply Co.), Scintilla Magneto Division, Bendix Aviation Corp., Pacific Airmotive Corp., Bendix Products Division, Bendix Aviation Corp., Hydro-Aire, Inc., AiResearch Manufacturing Co., Bridgeport Thermostat Division, Robertshaw-Fulton Controls Co., Westinghouse Electric Corp.

AUTOMOTIVE INDUSTRIES
Keeps You Informed

Facts you should know about Kearney & Trecker's Special Machinery Division

If you're a potential buyer of special machines or special tooling – read about our expanded facilities

THOUGH we've been designing and building standard and special machine tools since 1898, limited production facilities for special machines previously prevented us from offering these services on a wide scale.

But now, our Special Machinery Division has new and greatly expanded facilities. Its exclusive job will be to build special machine tools and tooling or specially to adapt standard equipment to solve specific metalworking problems.

Check our qualifications:

EXPERIENCE: We've been in the business 55 years. In addition to being one of the country's leading producers of standard milling machines . . . *our production of special machinery has ranged up to $3,000,000 annually.*

FACILITIES: The new Special Machinery Division plant, built on a 38-acre site, is equipped with more than *$2,500,000 worth of new tools and equipment.*

PERSONNEL: The Special Machinery Division engineering section has nearly 100 experienced design and production engineers at its command. These men specialize in applying to metalworking the latest developments in mechanics, hydraulics, electronics, metallurgy and allied fields. In addition, it has a full complement of experienced machinists and mechanics needed for special machine construction.

PERFORMANCE: Kearney & Trecker's Special Machinery Division is best recommended by its record of successfully solving hundreds of unusual machining problems. These include high production requirements as well as exacting dimensional accuracies and surface finishes.

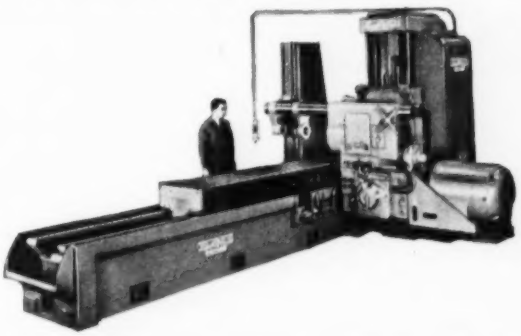
RESPONSIBILITY: Our Special Machinery Division is an integral part of the Kearney & Trecker Corporation . . . and is fully supported by all its financial, physical and personnel resources.

Any commitment for a product of this division is a commitment that fully involves the accepted reputation for responsibility and satisfaction that is Kearney & Trecker's.

We invite your inquiry

We'll be glad to provide you with any information we can . . . including sample machine specification sheets on typical installations, a brochure covering the expanded facilities of our Special Machinery Division, and details on our Customer Engineering Service. Furthermore, if you have special production machinery problems, have one of our senior Project Engineers analyze them, without obligation, of course.

Write, wire or phone the Special Machinery Division, Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



We've built special machines or adaptations of standard equipment for practically every industry. Here is a photo of a 50 hp CSM Simplex milling machine we designed and built for a leading manufacturer.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

Reduce SHUT-DOWN Costs

FOR PERIODIC MACHINERY INSPECTIONS

Inspecting inking rolls on a printing press . . . without disassembly.

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Ultrasonic REFLECTOSCOPE TESTING

NOW AVAILABLE FOR ANY DESIRED TERM THROUGH ECONOMICAL SPERRY INSPECTION SERVICE

Sperry Ultrasonic Testing makes it possible to conduct your periodic inspections of machinery and other production equipment rapidly and dependably without time and money-wasting disassembly. Penetrating up to 30 feet in solid metal, this latest and finest of the non-destructive testing methods locates hidden defects not detectable by the most careful visual inspection.

Reflectoscope Testing is available when you need it on an economical basis. Hire an experienced inspection engineer using a Sperry Reflectoscope for any desired time from 4 hours up.

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COMPANY _____
CO. ADDRESS _____
CITY _____
ZONE _____ STATE _____

Why Alternator Systems?

(*Continued from page 65*)

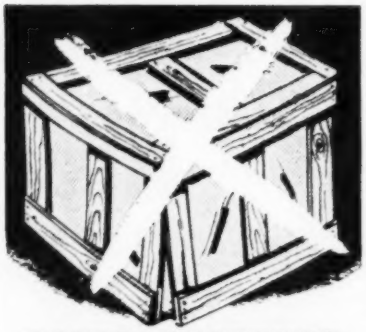
tions can be supplied by this type of electrical system. A graphical picture of the am-hr comparison is shown in Table 3. This clearly shows the excellent performance of the rectified a-c equipment.

The weight of the d-c generator and regulator equals 47.5 lb, this compares to 34.25 lb for the ac-dc equipment. The trend today, towards lightweight vehicles carrying heavy payloads shows the alternator system to be at an advantage compared to the other equipment. Relative cost between these two systems favors the d-c generator. At the present time, the initial cost for the ac-dc equipment is running 50 per cent greater than the d-c generator. This difference will decrease as production rates increase for the wide speed range rectified a-c systems. Bus applications of lightweight alternator equipment are directly competitive in cost and performance with the heavier d-c systems.

The foregoing article is an abstract of a paper presented by the author at the SAE International West Coast Meeting held last August in Vancouver, B. C., Canada.

BOOKS . . .

ELECTRICAL CONTROL SYSTEMS, (Third Edition), *by Richard W. Jones, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. Price, $7.75.* This book is directed toward senior students who have had courses in a-c and d-c machinery, ordinary differential equations, and basic electronics. The text develops a sound physical explanation of its subject, organizing its material on a functional basis—a basis which aids the student in the process of coordinating his previous work on circuits, electronics, and machinery. Specifically, the volume combines these distinctive features: integrates the subjects of machinery, electronics, circuits, and transients; adopts a functional approach which facilitates the student's concentration on principles; uses both analysis and graphical methods to develop basic ideas; develops the fundamental aspects of relay switching networks, and introduces Boolean algebra for this purpose. It also considers both relay and electronic counting circuits; treats power amplifiers of both the dynamo-electric and magnetic types and developes the concept of transfer functions; introduces the fundamental concepts involved in the study of feedback controllers as a natural extension of the study of controllers without feedback; and includes problems which bring out additional points not covered in the text and contains an extensive bibliography.



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REUSABLE METAL CONTAINERS

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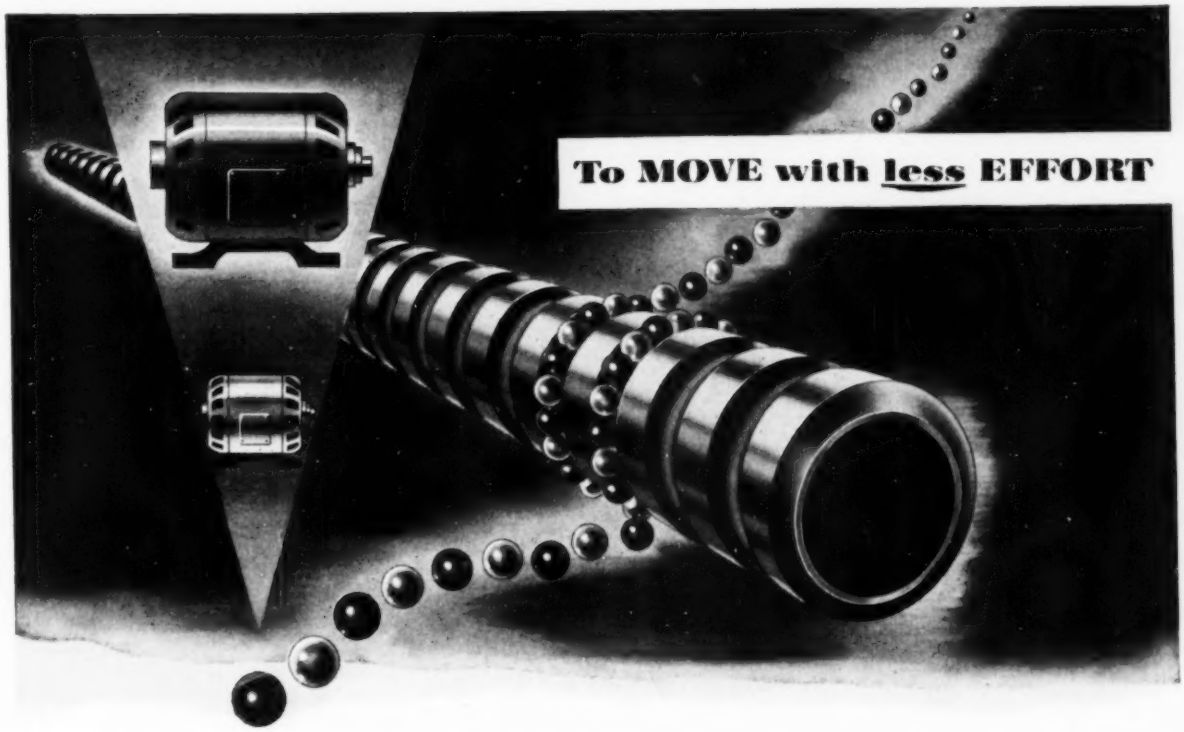

WE'VE DISCOVERED HOW TO Shrink your motors

-by Floating a screw on a stream of balls!

We eliminate the need for the excess power that was added to overcome friction in the old-fashioned screw-type drives.

Ball-screw actuators made by Cleveland Pneumatic have an efficiency as high as 90% on most types of drives for machines. This lets you use a ⅕-horsepower motor instead of a 1-horse... a 5-horse instead of a 10... with power to spare.

It's done by replacing the famous old high-friction Acme thread principle with a spiral ball-bearing thread that does wonders for efficiency. Sliding friction is replaced by the rolling action of the screw and nut over the steel balls in the threads.

These "AEROL" Ball-Screw Actuators are at work *now*... in the air at scores of spots on aircraft; on the ground in machine tools, in research equipment, on trucks and cars; at secret locations on difficult defense projects.

We can also cut down friction in *your* designs and products... by shrinking the size of motors, easing the effort it takes to hand-actuate a device, making equipment move faster yet come to a more precise stopping point under any condition. Our Actuators operate smoothly under the greatest extremes of heat and cold.

When can we discuss with you the application of our AEROL Ball-Screw Actuators in your business? If you wish to know more about Cleveland Pneumatic Actuators and their uses... write for our booklet.

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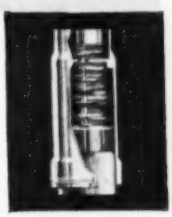

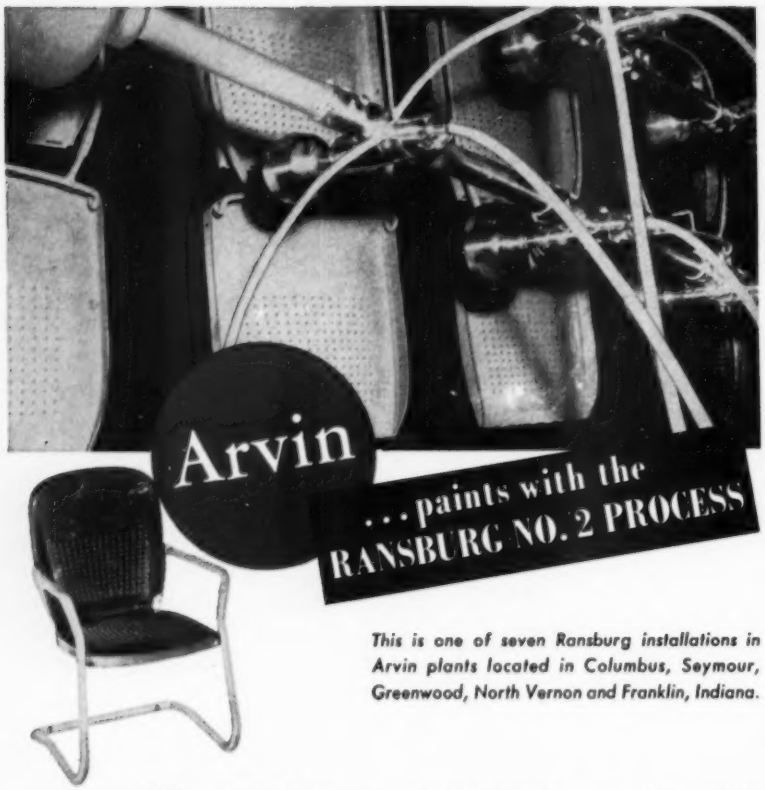

This is one of seven Ransburg installations in Arvin plants located in Columbus, Seymour, Greenwood, North Vernon and Franklin, Indiana.

When Arvin chair seats and chair backs were redesigned to be perforated with hundreds of little holes in each piece, the former dipping method of coating was unsatisfactory. Here are other reasons why RANSBURG NO. 2 PROCESS was selected to do the finishing job:

1. **Simplicity and rapidity with which colors may be changed without slowing production.**
2. **Less floor space required.**
3. **Provides improved quality with no variance in the required 7/10 mil film thickness.**
4. **Former maintenance and clean-up time reduced to a minimum.**

No savings in paint cost were anticipated. However, the RANSBURG NO. 2 PROCESS—in providing the above, desirable advantages—still enables Arvin to reduce finishing costs 10%. And, that over dip coat!

Want to know more about production efficiency of the NO. 2 PROCESS as it applies to YOUR production? Write for literature showing a variety of typical production installations in factories all over the country.

RANSBURG

Ransburg ELECTRO-COATING CORP.

INDIANAPOLIS 7, INDIANA

METALS——

(*Continued from page* 94)

and wire products. Business in stainless and alloy steel is definitely off, with some concerns operating at 70 per cent capacity and on a four-day week. Iron foundries are working on curtailed schedules with some price cutting, and pig iron is easier.

Operating Rate May Approximate 90 Per Cent In Fourth Quarter

The Iron Age estimates 1953 output of steel at 112 million ingot tons. Other estimates are as low as 107 million tons. For the first eight months of 1953 steel output was 76.6 million tons. Taking the *Iron Age* estimate of 112 million tons for the full year would leave 35.4 million tons for the last four months. At the estimated annual capacity rate this indicates about 90 per cent operating rate for the rest of the year, a ratio somewhat less than the 95 per cent rate anticipated by the chairman of U. S. Steel in a recent statement. If the average rate of operations in 1954 approximates the rate in the fourth quarter, an indicated 106 million ton annual rate, the industry would operate at 88 per cent with its expanded capacity of 120 million tons.

Of course an operating rate at 88 per cent of 120 million ton capacity would provide the country with more steel than a 100 per cent rate in any other prior year when steel capacity was much lower.

Curbs on Civilian Nickel Are Ended

Both the manganese and chromite markets are easier as the steel demand softens. More cobalt is coming in from abroad. Civilian curbs on use of nickel cease on November 1 and manufacturers will no longer be subject to Government restrictions on the amount of nickel stainless steel they use. However, priority for the military service, atomic needs, and stockpiling will remain in effect. Defense requirements will continue to take about 40 per cent of the supply.

While the Government order ending civilian curbs on nickel is gratifying, it appears that nickel supply won't meet total demand for several months.

(*Turn to page* 122, *please*)

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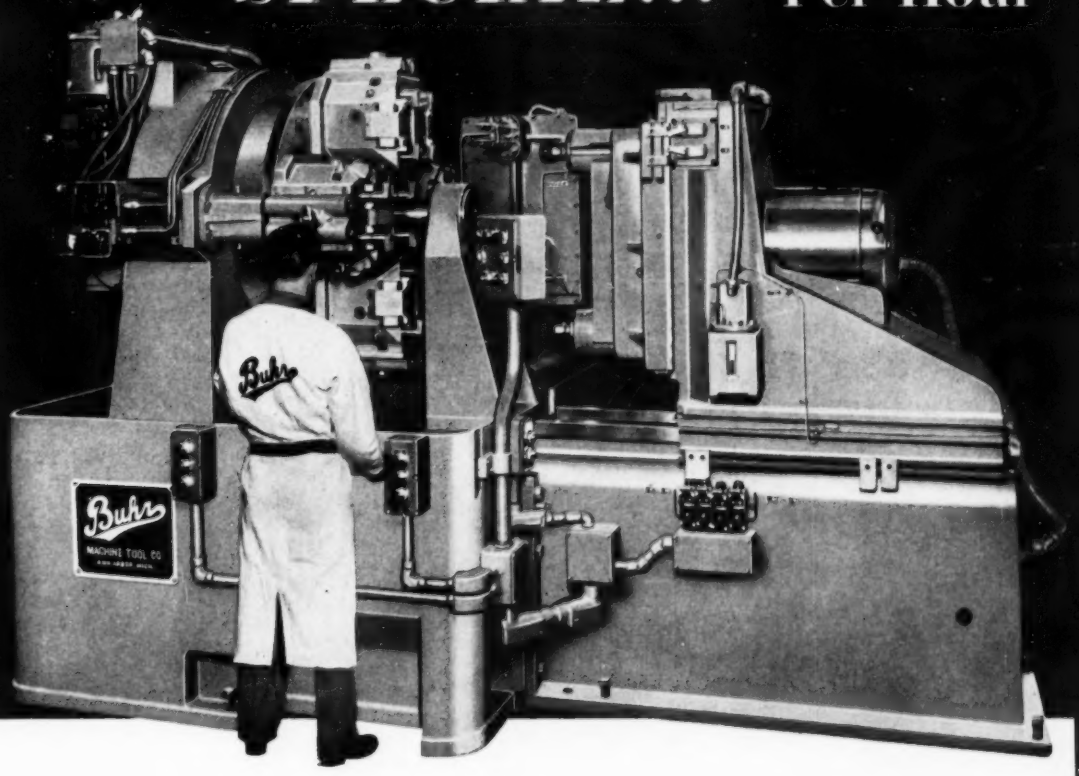
Mills and taps 510 Oil Seal Retainers Per Hour



Fixture is arranged with hydraulically operated automatic clamping and automatic index.

Operation: Loading two parts. Station 1 — Load and Clamp.
Station 2 — Tap (2) 5/16-18 Holes and mill two Slots.
Station 3 — Idle.
Station 4 — Tap (2) 5/16-18 Holes and mill two Slots.

As with all Buhr Specials, fixtures are completely interchangeable, hydraulic and electrical installations to J.I.C. Standards, tool steel laminated, hardened and ground ways. Automatic lubrication throughout Machine.

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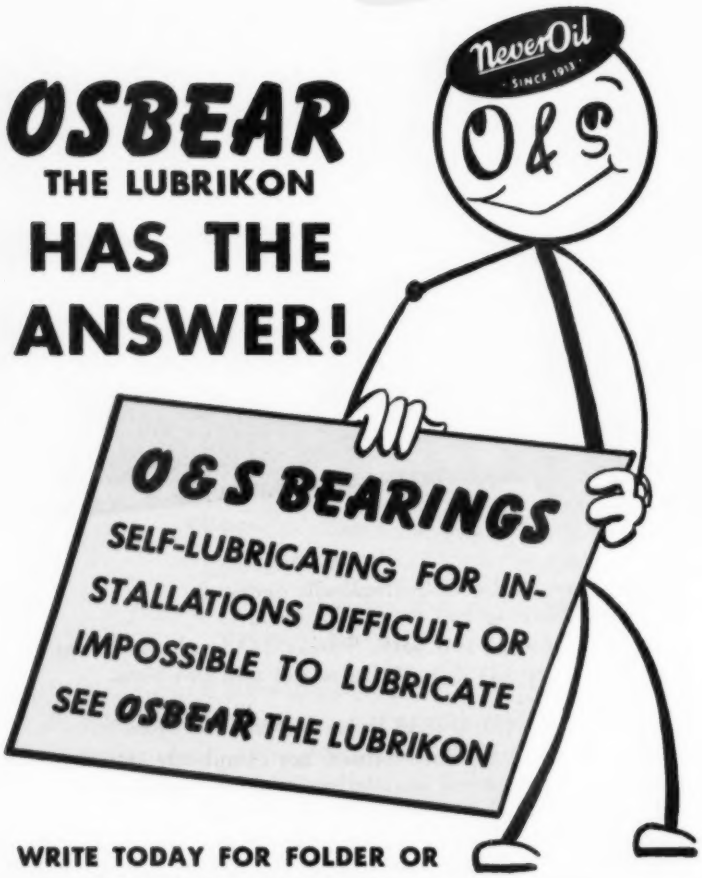

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But it may prove a life saver for some 3800 small electro-platers who had been threatened with extinction by the severity of the Government's nickel curbs. There is some reason to think that larger supplies will be available early in 1954 as a new important Canadian mine begins production.

Aluminum Production to Rise in Fourth Quarter

Total production of aluminum in the fourth quarter will be about 325,000 tons, an indicated annual rate of over 1,300,000 tons. Of this, about 116,000 tons comes from new production. Because of the increased output, more than 50,000 tons of primary aluminum will be made available to independent fabricators in the October-December period, or 40 per cent more than the amount required under existing contracts the Government has with the major producers.

Aluminum producers are exhibiting some concern over the market and one prominent executive has said he expects some lessening in demand after the first of the year. No major decline is expected, but it will be a case of selling the metal instead of allocating orders in priority. Some soft spots have developed already for fabricated products, notably for building products used in the farm areas. Foil and sheet demand, however, remains good and use in automobiles, trucks, buses, and railroad cars continues to rise.

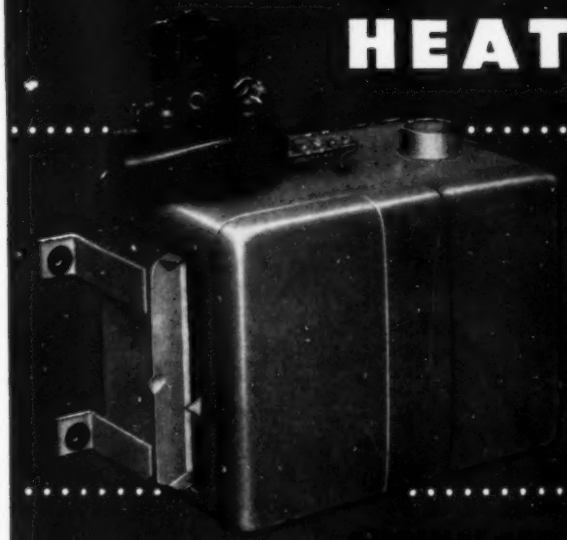
Copper Price Firm But Lower Market Foreseen

Copper remained in surprisingly good demand through the middle of October in the face of virtually unanimous belief that its statistical position was impaired and lower prices were certain to come. The Chilean situation remained unsettled with negotiations dragging out endlessly at Washington. Unused stocks of Chilean metal, estimated at over 130,000 tons, continued to hang menacingly over the market. Until their disposition was settled, buyers were unwilling to make substantial forward commitments and interest was light for future months.

August figures released by the Copper Institute showed an alarming drop in deliveries to consumers outside the United States. At the same time foreign copper mine producers added nearly 43,000 tons to their stocks, just about as much as they

(*Continued from page* 120)

NEED POWERHOUSE HEAT OUTPUT?



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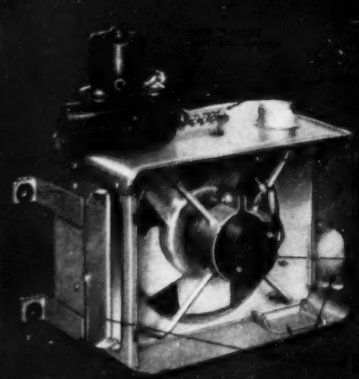

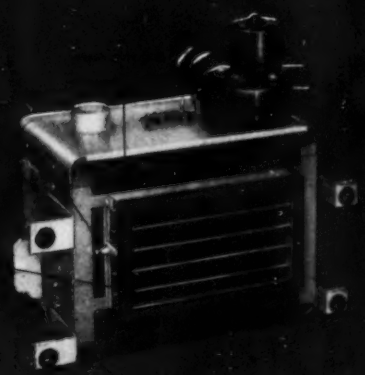

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FOR EVERY TRUCK AND BUS

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- PROCEDURES
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- BOND STRENGTH RATINGS

The answer to that troublesome problem may be a rubber-to-metal bonded part which combines the best properties of metal and rubber in one bonded unit to obtain strength, toughness and resiliency, shock and vibration absorption, sound abatement, electrical insulation, corrosion and abrasion resistance, etc.

Detailed information concerning this modern adhesion process is contained in the Acushnet brochure "Rubber-To-Metal Bonded Parts", a helpful guide available upon request.

Acushnet's specialization in this field involves the adhesion of rubber or synthetic rubber to metal in molds designed to accommodate the metal parts and which, in addition to bonding the rubber material to the metal, form and vulcanize the rubber in the same operation.

Acushnet PROCESS COMPANY

As adhesion can be obtained on most metals, this process provides the design engineer with another method to simplify design, reduce costs and improve performance.

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shipped to users. Foreign stocks of refined copper at the end of August stood at a record total of 209,220 tons, highest since the war.

The domestic supply situation was tightened by strikes at important producers in New Mexico and Canada, cutting off about 10,000 tons a month. A slowdown at Kennecott's big Utah refinery cost 5000 tons. Loss of normal Chilean copper has forced Anaconda to seek copper elsewhere to supply the needs of its fabricators, American Brass and Anaconda Wire & Cable.

When settlement is finally made with the Chilean government, the terms will probably include selling the normal output at the world price, now about 27-28 cents per lb. This could well be the signal for a speedy adjustment to about the 24-25 cent level with the domestic price likewise declining. At any rate, that's what the commodity markets are saying, where 1954 delivery is quoted about 23-24 cents for the spring months.

No Cheer in Zinc Situation

Discouraging is a mild word for the September zinc statistics. Slab production was scarcely unchanged from the high average of the last six months. Shipments dropped 11,700 tons during the month to the lowest figure since the steel strike. Stocks of slab climbed to 141,494 tons, highest since 1946, and unfilled orders declined to 27,323 tons, lowest figure for 10 years.

Zinc imports in July totalled 84,700 tons, another record high. The only hopeful news was that they showed a negligible increase over the June imports. However, for the first seven months of this year net zinc imports averaged 65,500 tons per month against an average of 41,900 tons in 1952. That's a 55 per cent increase and explains why domestic zinc mining today is a very sick industry.

Zinc producers are hoping they will gain some relief under the escape clause of the Reciprocal Trade Agreement Act. Public hearings will be held in November. If the producers make out a good case the present tariff on lead of 1 1/16 cents per lb could be raised to 2.55 cents and the 0.7 cent zinc tariff could be upped to 2.1 cents. It's not likely that it will be smooth sailing. Consuming interests, anxious for cheap zinc, will certainly make a fight against tariff.

Continued bickerings between producers and consumers of zinc have made a confusing picture. All agree

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that wide price swings for the metal are contrary to the best interests of both parties, particularly because zinc is especially vulnerable to competition from other metals in many fields. The dispute concerns what is a fair price.

Consumers, spearheaded by such important concerns as the Precision Castings Co. representing the zinc diecasting industry, who take about 250,000 tons of Special High Grade zinc annually, want no interference with free imports from abroad. They point out that aluminum consistently sells at a low stable price and imply they may be forced to change over to aluminum unless a reasonable price pattern is maintained for zinc.

Producers' Viewpoint

Zinc miners declare that present labor costs do not permit profitable operation at 10 cents per lb which is actually less than 8¼ cent OPA price of 1942-5 if consideration is given to the Government's higher index for commodity prices since the war. Only by mining their best grade of ore can they break even and that means shortening the life of the mines and leaving huge tonnages of low grade ore unmined.

They want higher tariff protection, but they don't agree on what scheme to adopt. Some producers want a subsidy for domestic producers, somewhat similar to the Government cost-aid program for Canadian gold producers. Other think that import quotas would be the answer. The difficulty here would be allocating fair amounts to numerous foreign countries. A straight increase in tariff rates would be simplest but would bring a storm of protest from foreign governments on the ground that Washington, greatest exponent of free enterprise and elimination of tariff barriers to world trade, was now repudiating those very ideals. Finally, there is the sliding scale tariff proposed, which would erect a tariff against imports when prices were low, but eliminate it when prices were reasonably profitable.

Lead in Fair Demand, Price Little Changed

To assert that the position of lead is better than that of zinc is hardly a strong statement, but it is all that can be said. While producers were unable to maintain the 14 cent per lb price after September 16, the reduction of ½ cent to 13½ cents appears to satisfy buyers. Demand, however, is not robust, especially from storage battery manufacturers. In some cases, buyers have asked that deliveries be deferred. Supplies of scrap lead from used battery plates are very large and some secondary smelters have raised processing charges to as high as $80 per ton.

But there is less pressure on the lead market from imports than with zinc. While still at a very high figure, totaling 46,500 tons in July, imports were 11,500 tons below June, and considerably less than the average in the first half of the year. In short, Europe is taking more foreign lead and often offering as good a price as could be obtained in New York after paying shipping and tariff charges. Considerable interest is displayed in apparently reliable reports that Russia has established sterling credits in London through sales of gold, silver, and platinum and is using a big portion of the proceeds to acquire lead and copper.

Tin Price Improves Slightly

The tin price improved slightly in October, although the main reason ascribed—fear of delay in deliveries

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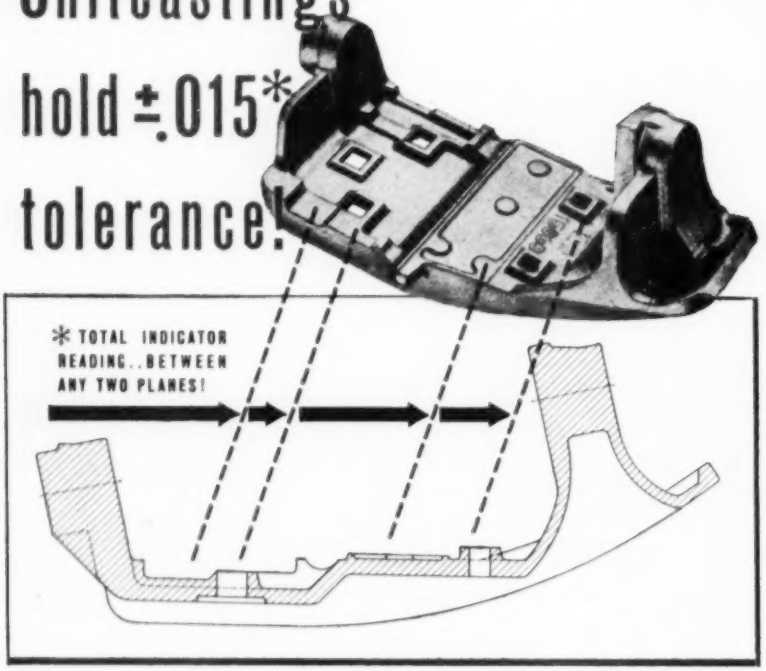

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Functioning as an important part of a mowing machine cutter mechanism, this Inner Shoe is responsible for holding all correlated parts in alignment. Accuracy must be maintained throughout the roughest service . . . and *initial accuracy* is a "must" in reducing assembly cost!

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because of the dock strike in New York—could hardly be more than temporarily important. Of more significance was the decline in Malayan production as more tin mines shut down because of low prices. It is also believed that the forthcoming meeting of tin producers with strong Government support will result in some limit on output and a subsequent reduction in unwieldy world tin stocks which now total about 84,000 tons exclusive of metal in strategic stockpiles.

SHORTIES

Maximum horsepower developed by a modern jet bomber is 10,000 times greater than that developed by the engine in the first Wright airplane.

•

Twenty years ago, the average fighter weighed about 5000 lb. Today's jet fighters gross in the neighborhood of 30,000 lb.

•

In 1952, corporate aircraft owners in this country logged well over 422 million plane-miles. This compared with the 457 million plane-miles flown during the same period by the scheduled domestic airlines.

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For every dollar of sales, the aircraft industry spends six times as much money in research as does the average U. S. manufacturing industry.

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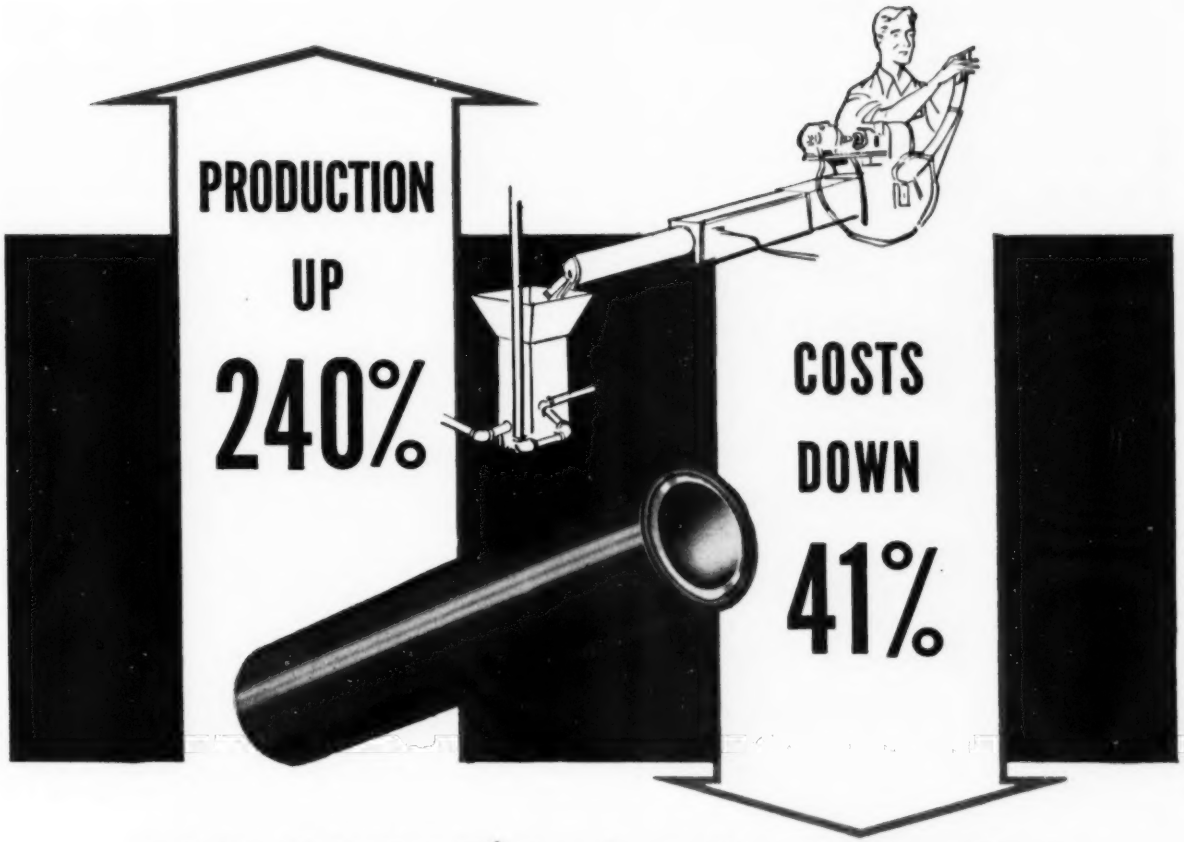

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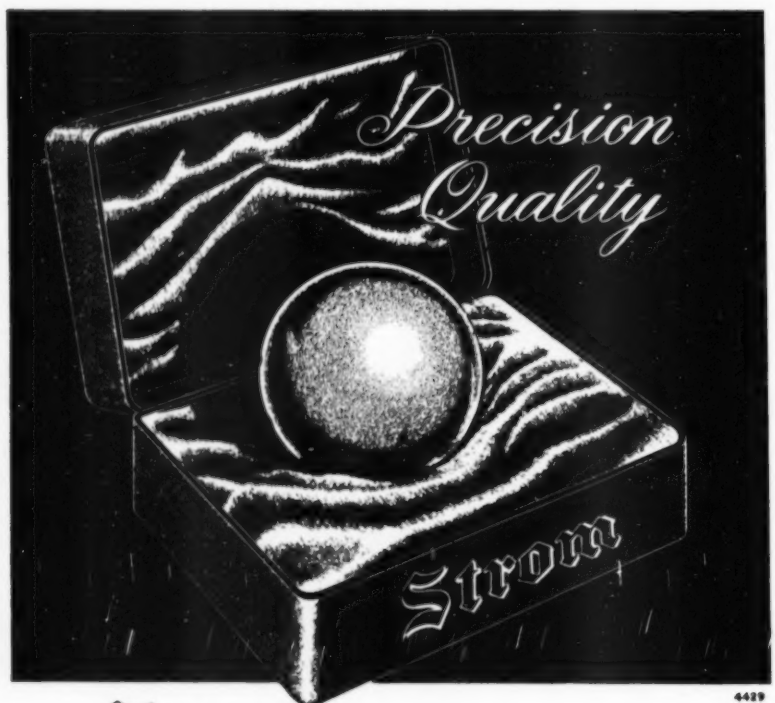

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Of AUTOMOTIVE INDUSTRIES, published semi-monthly at Philadelphia 39, Pa., for October 1, 1953.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, G. C. Buzby, East Sunset Ave., Chestnut Hill, Philadelphia 18, Pa. Editor, James R. Custer, 303-B Hampden Road, Upper Darby, Pa. Managing editor, None. Business manager, G. C. Buzby, East Sunset Ave., Chestnut Hill, Philadelphia 18, Pa.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) Chilton Company, Chestnut and 56th Sts., Philadelphia 39, Pa.

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5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

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PHILIP J. SHIRE, JR.

(My commission expires January 7, 1955.)

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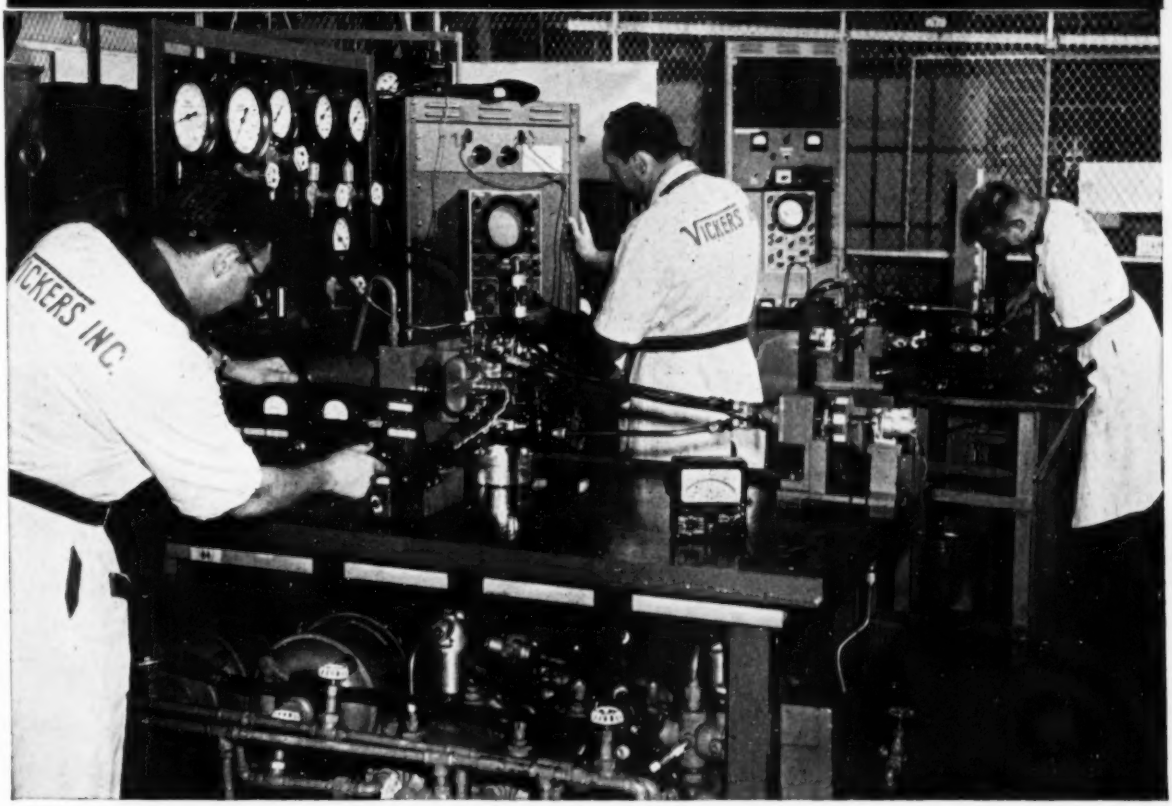

Research | that means improved oil hydraulic equipment

The list of pioneering developments in hydraulics contributed by Vickers research is long and impressive. Among the most important are:

Hydrostatic Relief Valve • Commercial Power Steering • Balanced Vane Type Pump • Flow Control Compensator • Axial Piston Pump and Motor

These are fundamental developments that have been of vital importance in the progress of hydraulics. They are representative of a large line of equipment that, with Vickers experienced application, assures you the best in any type of hydraulic operation. Vickers, with unmatched laboratory and basic research facilities, continues to lead the way in the oil hydraulics industry.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

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ALLOY PREPLACEMENT is a key factor in the tried and proved EASY-FLO and SIL-FOS low-temperature silver alloy brazing formula that gives you *any brazing production you want* at surprisingly low cost. It's a simple a b c formula... where a = assembling parts with EASY-FLO or SIL-FOS *pre*placed at the joints... b = using a fast heating method such as oxyacetylene torch, furnace, electrical induction, gas-air burners, etc.... c = devising a production set-up that keeps assemblies moving steadily to and through the heating station. This formula eliminates the human element from the actual brazing. It assures fast, reliable production with unskilled labor.

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CALENDAR

OF COMING SHOWS AND MEETINGS

SAE National Transportation Meeting, Conrad Hilton Hotel, Chicago, Ill. .....Nov. 2-4

SAE National Diesel Engine Meeting, Conrad Hilton Hotel, Chicago, Ill. .....Nov. 3-4

Vickers' Third Transport Aircraft Hydraulic Conference, Park Shelton, Detroit, Mich. .....Nov. 3-4

SAE National Fuels and Lubricants Meeting, Conrad Hilton Hotel, Chicago, Ill. .....Nov. 4-6

17th Annual Time and Motion Study and Management Clinic, Industrial Management Society, Sheraton Hotel, Chicago, Ill. Nov. 4-6

Refrigeration and Air Conditioning Exposition, Public Auditorium, Cleveland, O. .....Nov. 9-12

American Petroleum Institute Meeting, Hilton Hotel, Chicago, Ill. Nov. 9-12

Montreal Materials Handling, Tool and Industrial Equipment Shows, Show Mart, Montreal, Que. .....Nov. 9-13

Association of American Battery Manufacturers, Fall Meeting, Edgewater Beach Hotel, Chicago, Ill. .....Nov. 16-18

Fourth Pan American Road Race, Mexico .....Nov. 19-23

American Society of Mechanical Engineers, annual meeting, Statler Hotel, New York, N. Y. Nov. 29-Dec. 4

American Society of Agricultural Engineers, winter meeting, Edgewater Beach Hotel, Chicago, Ill. .....Dec. 7-9

1954

SAE Annual Meeting, Sheraton-Cadillac Hotel and Hotel Statler, Detroit, Mich. .....Jan. 11-15

National Motor Boat Show, Bronx, N. Y. .....Jan. 15-23

Plant Maintenance & Engineering Show, Chicago, Ill. .....Jan. 25-28

Society of Plastic Engineers, 10th annual technical conference, Royal York Hotel, Toronto, Ont. .....Jan. 27-29

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y. .....Feb. 17-19

SAE National Passenger Car, Body, and Materials Meeting, Hotel Statler, Detroit, Mich. .....March 2-4

Geneva Automobile & Truck Show, Geneva, Switzerland .....Mar. 11-21

ASTE Industrial Exposition, Philadelphia, Pa. .....April 26-30

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Hydraulic Conference

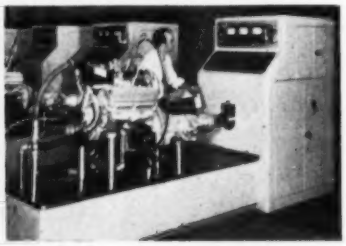
(*Continued from page 55*)

The paper presented the approach Ford engineers took in designing, developing, and testing the system used in the new Golden Jubilee Ford tractor and, in turn, pointed out the many design considerations that must be recognized in order to produce a satisfactory unit.

The paper embodied a resume of the experience gained through the production of 825,000 tractors equipped with previous designs of hydraulic controls. This experience, coupled with the technological advancements at Ford, formulated a program to extend the usefulness of the tractor by increasing its size and power and providing a more flexible hydraulic system. A comprehensive explanation was given of the circuit and linkage by the use of slides. The paper also dealt with the problems of tailoring the circuit to provide a unit most compatible with the tractor and equipment.

Rough road testing machine

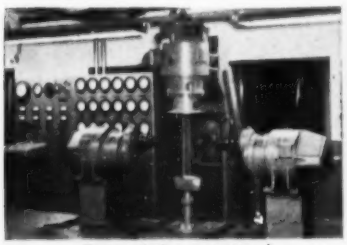
Engine dynamometer (absorption)



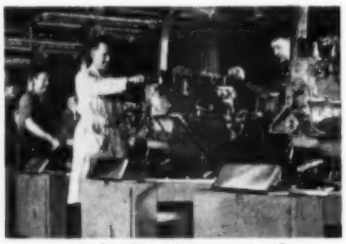
The "No-Mile" Inspectors

Engine dynamometer (hydraulic)

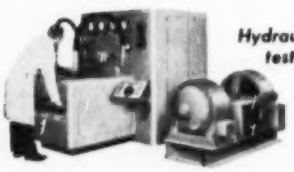
Test after test after test! New cars are subject to a never-ending series of them. Pictured here are just a few Nankervis testing devices in everyday operation—some standard, some special! You, too, can find help at Nankervis. Write today!



Transmission test stand



No-load engine test stand



Hydraulic pump test stand

Automotive accessories test stand

GEORGE L. NANKERVIS COMPANY

INDUSTRIAL TESTING DEVICES

19255 W. Davison Avenue Detroit 23, Michigan

Hydraulic Mechanisms for Operating Auto-Window Lifts, Convertible Tops, Seat Adjustment, Etc.

by C. L. Kalitta

Detroit Harvester Company, Warner Division

THE trend toward automatic actuation in automotive industry has led to the development of a hydraulic system peculiar to this application for the actuation of such items as the convertible tops, window lifts, seat adjusters and the like. Simplicity and low cost were of prime importance in design with the result that rather drastic departures were made from the present day industrially accepted hydraulic standards. High production techniques were utilized to produce the components at a cost that would attract the automobile industry.

Two basic power sources have been developed for these systems, the first being a reversible motorpump for convertible top actuation; while the second is a larger uni-directional motorpump used for window lifts and seat adjustment. Convertible top actuation can also be achieved with this system by the addition of a four-way valve for the double acting cylinders.

The pumps used in both systems are made of die castings and powdered metal parts that require a minimum amount of machining.

The cylinders used for the window lifts are of a single acting type that utilize stampings and crimped assemblies to maintain low fabrication costs.

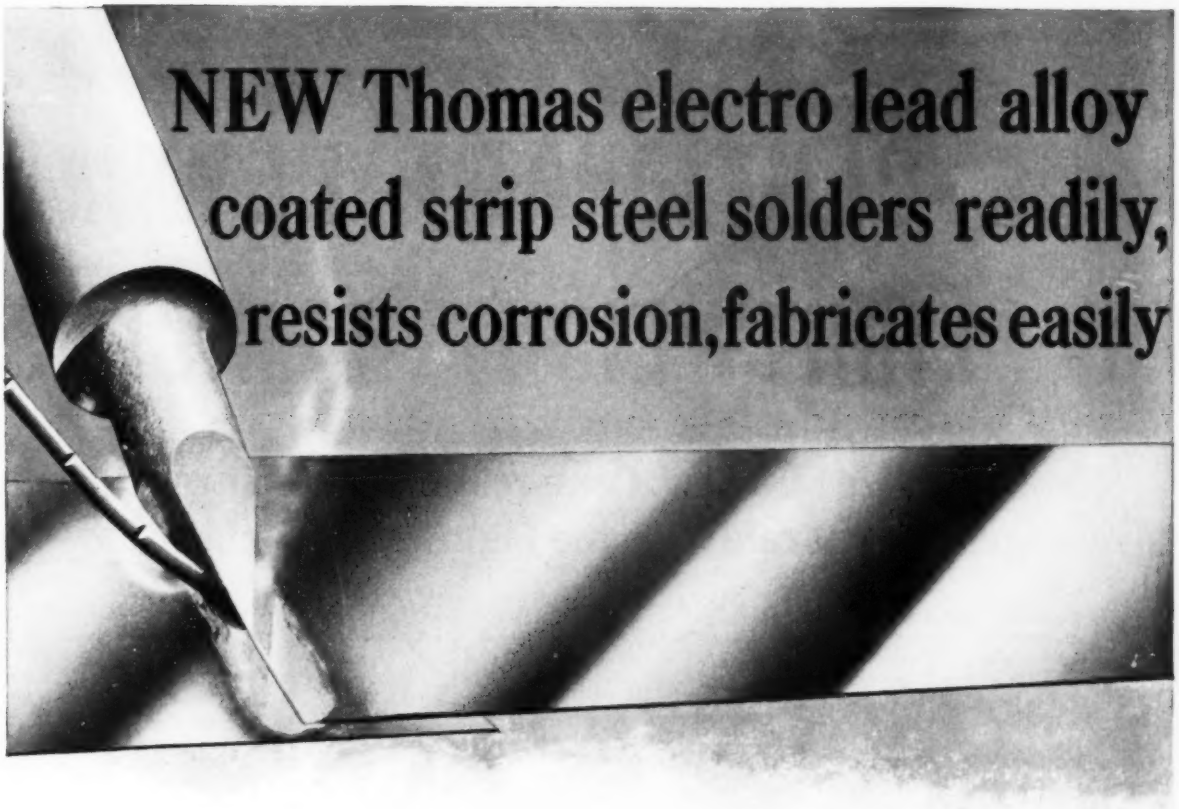
Economics of Standardized Maintenance and Testing in Airplane Fluid Systems

by Julius Kendall

Greer Hydraulics, Inc.

THE paper covers hydraulic systems and other components as well as fuel systems. Emphasis is on the hydraulic controls and valves and jet turbine engines as they pertain to the fuel systems. The paper covers the hydraulic development in

(*Turn to page 138, please*)



NEW Thomas electro lead alloy coated strip steel solders readily, resists corrosion, fabricates easily

The newest addition to the Thomas family of pre-coated steels—*electro-plated lead alloy cold rolled strip steel*—gives you another method of improving your products and reducing your costs. The homogeneous and dense lead-tin alloy coating provides excellent resistance to corrosion, improves the soldering and spot welding qualities of the strip.

The ease with which Thomas Electro-coated lead alloy can be soldered without an acid flux and with a minimum consumption of solder is a distinct advantage to the fabricator. It retains its solderability over a considerable period of time. The coating also provides an excellent base for paints and synthetic enamels and acts as a lubricant in drawing operations.

Thomas Electro-coated lead alloy is available in the gauge range of .005 to .050 up to 20″ in width. For information on this new product and the other economical Thomas pre-coated steels listed below, write today.

Cold-rolled strip steel electrolytically pre-coated with Zinc, Copper, Brass, Nickel and Lead-Alloy in Natural, Planished and Buffed Finishes—Hot Dip Tin and Lead-Alloy Coated—Lacquer Coated in Colors—Annealed Spring Steel—Alloy Strip Steel—Uncoated Strip Steel. Carefully produced to your specifications.

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Thomas Strip Division

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A REVOLUTIONARY NEW AIR FOR LIGHTWEIGHT VEHICLES!

New small size TU-FLO 300 Compressor Now Brings All the Advantages of Air Braking to the Lightweight Field at Low Cost!

Bendix-Westinghouse, long the leader in heavyweight braking now offers operators of lightweight vehicles all the proven benefits of the world's most effective and efficient braking power—AIR! Yes, regardless of how small your vehicles may be you can now enjoy the faster, smoother, surer, more effortless stops possible only with Air Brakes!

TU-FLO 300 COMPRESSOR—GIANT IN PERFORMANCE—MIDGET IN SIZE—An outstanding new Bendix-Westinghouse development, the Tu-Flo 300 Compressor makes this lightweight air brake system possible. Less than 8½ inches high and weighing only 14 pounds, this remarkable two-cylinder reciprocating piston-type compressor retains many proven basic design features, plus a superior new unloading mechanism and new design inlet valves. It is air-cooled, quiet running, and built to operate efficiently at higher speeds. Its compactness and light weight combined with its ruggedness and high performance bring the time-proven reliability of Air Brakes to lightweight vehicle owners—offer the comforting feeling of extra safety to their drivers.

NEW TYPE "E" TREADLE BRAKE VALVE—This new unit also is specifically designed for lightweight vehicle installations. Drivers will like the "feel" of this new treadle-type valve. A slight foot depression of the comfortably angled treadle and the power of air does the work. The full graduating characteristics of the valve always provide for complete driver control of the vehicle. Smoother, surer braking results. Driver fatigue is reduced, confidence increased.

NEW AIR-HYDRAULIC ACTUATORS—A complete new line of air-hydraulic actuators permits selection of proper size and mounting to suit all hydraulic master cylinder requirements. They are compact, dirt-proof, require no lubrication and practically no maintenance.

COMPACT, LOW-COST KITS FOR EASY INSTALLATION—The new lightweight Bendix-Westinghouse Air Brake System is available in handy kits containing everything down to the last nut and bolt to make installation a cinch. There is a kit to fit any make or model lightweight vehicle.

NOW AT YOUR BENDIX-WESTINGHOUSE DISTRIBUTOR—Stop in and inspect this new system at your Bendix-Westinghouse Distributors at your first opportunity. Take a demonstration ride. You'll be convinced that for lightweight vehicles, too, the best brake is AIR and the best Air Brake is Bendix-Westinghouse.

The best brake is air . . .
The best air brake is **Bendix-Westinghouse**

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY

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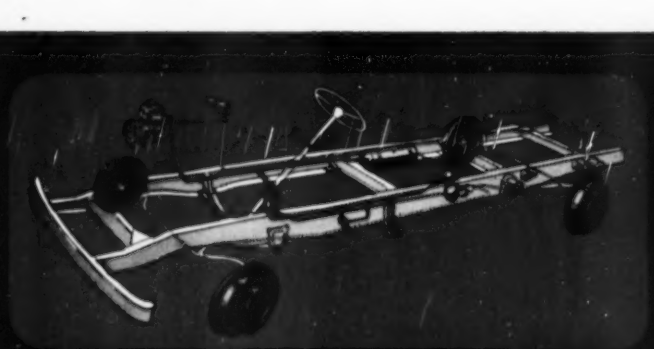
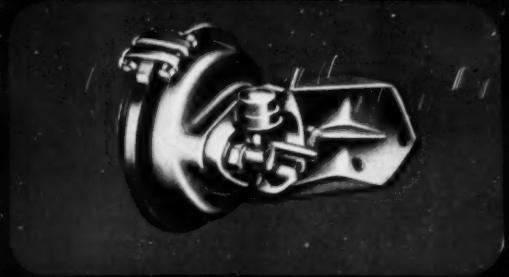


SIMPLE, COMPACT, EASY TO INSTALL

NEW TYPE "E" TREADLE BRAKE VALVE

ANNOUNCES BRAKE SYSTEM



NEW AIR-HYDRAULIC ACTUATORS

Hydraulic Conference

(*Continued from page* 134)

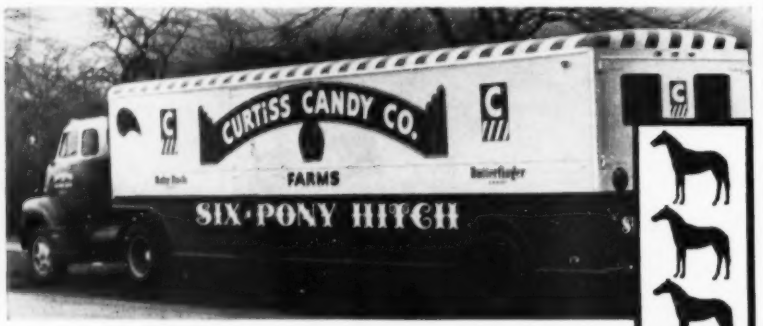
aviation during the past 15 years as it affects methods and procedures of testing and maintenance, broken down as follows:

1—Problems of the airline operator in attempting to get the best utilization of aircraft due to the variability of locality in which he is operating, requiring that maintenance and overhaul be carried out in various locations and standardization of procedures and equipment such that the same results can be obtained regardless of where work is done.

2—Problems of keeping abreast with technological changes to be sure that new equipment and procedures are available as new accessories develop so that commercial overhaul facilities will be available when equipment should require overhaul.

3—Design of test equipment that average mechanics can readily utilize and from which they can interpret the results for the problems that might be encountered in everything from reciprocating to turbo-jet or turbo-prop engines.

4—The fundamental principles of overhaul and test which develop from component manufacturer to airframe manufacturer, to military operator, to commercial airlines. The need for standardized procedures and methods both in military and commercial aircraft and maintenance.



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Luxury riding for the Curtiss Six-Pony Hitch isn't extravagance! Jolts and side-sway are bad for ponies on wheels. Special chassis by Bartlett and special springs by Tuthill provide smooth travel for the 6-pony team and its display wagon. The same spring designing skill can help you solve *your* special or unusual load problems.

For rugged service and top performance in every application—stock or special duty—get the *best*—specify SPRINGS by TUTHILL!

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Fluid Carriers for Hydraulic Units in Earthmoving Equipment

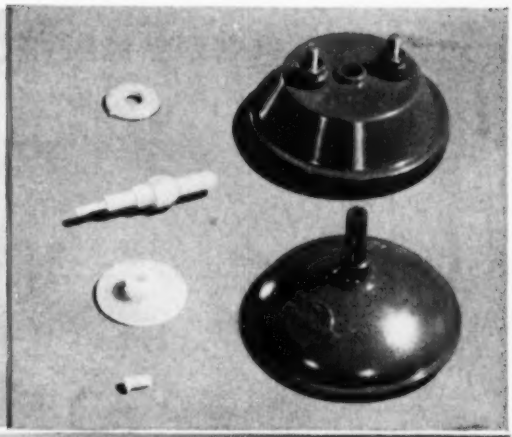
by J. E. Jass
Caterpillar Tractor Co.

THE upsurge in popularity of hydraulic actuating units for earthmoving equipment can be traced to the improvement in the components making up these systems. Better life in pumps, valves, the introduction of effective filters, and the more effective sealing of fluid carriers have combined to produce hydraulic units that are considered both reliable and versatile. A great amount of development work has been done on each of these elements to bring them to their present customer acceptance. The fluid carrier has been no exception in this story.

At least three types of fluid carriers are still in common use on earthmoving units: regular black iron with tapered pipe threads and fittings is still found in many applications; seamless, or welded steel tubes shaped to the proper configuration with welded flanges provided with "O" ring joints have increased in popularity since World War II; and tube carriers with assembled elbows and fittings of the compression type, or with some other design of "on the job" assembled fittings also are still popular. Each of these types, usually in combination with high pressure hydraulic hose, make up the means for getting the hydraulic fluids from the pump to the valves and to the hydraulic actuating cylinders. Examination of typical earthmoving machines indicated reasons for choice of each type, but provides the necessity of keeping the fluid inside the carrier so that absolute leak prevention and dirt exclusion is met.

The future needs for more easily designed hydraulic units and especially fluid carriers into earthmoving

Parts of Du Pont nylon are strong, can't corrode, need no oiling...



...help automatic starter withstand vibration, give long, trouble-free service

Why not investigate how this unique engineering material—DU PONT NYLON —can help improve your product?

These six parts, as used in a new starter developed for automatic transmission cars, demonstrate how the unique properties of Du Pont nylon can help engineers develop more efficient products.

Du Pont nylon is strong and durable. Parts made of it withstand shock and vibration. Nylon can't corrode, is unaffected by most common chemicals. Du Pont nylon is light in weight, heat-resistant and remarkably resilient. Parts resist wear and abrasion, provide quiet operation with little or no lubrication. And Du Pont nylon's electrical insulating properties insure positive operation.

Perhaps the valuable properties of Du Pont nylon can help you develop a new or improved product or process. For further information on Du Pont nylon write: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room 1711, Du Pont Bldg., Wilmington 98, Delaware.

Check all these outstanding properties of Du Pont nylon—

- √ **TOUGHNESS** — Nylon is virtually unbreakable, even at low temperatures.
- √ **HEAT RESISTANCE** — Nylon is capable of continuous operation to 250°F.
- √ **ABRASION RESISTANCE** — Nylon resists wear, scuffing and gouging.
- √ **STRENGTH, RESILIENCY** — Nylon absorbs shock without chipping or cracking . . . is strong in thin sections.
- √ **LIGHT WEIGHT** — Nylon's specific gravity is 1.14.
- √ **CHEMICAL RESISTANCE** — Nylon is unaffected by most common chemicals.
- √ **LOW COEFFICIENT OF FRICTION** — Nylon has excellent bearing characteristics — provides quiet operation with little or no lubrication.

Nylon parts molded by United Plastics Industries, Inc., Vassar, Mich., for Automo Corp., Saginaw, Mich.

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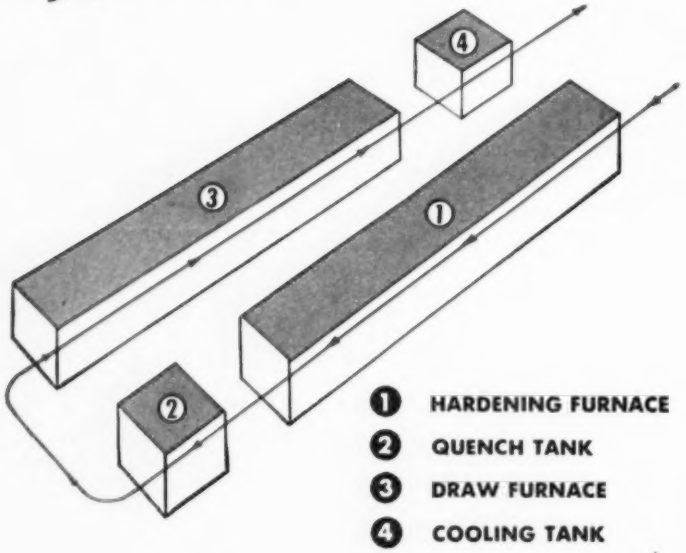
NYLON
Plastic
Better Things for Better Living
. . . through Chemistry

Heat Treat Furnace Layout

by *Holcroft* ...4th of a Series



Automatic Heat Treating Speeds Forging Production

Holcroft developed this automatic furnace unit in order to heat, quench and temper automotive crankshaft forgings.

It consists of a gas-fired hardening furnace, a quench tank, a draw furnace and a cooling tank. So automatic is the production, that a two-man team can handle the entire operation. As a result, the unit contributes materially to trimming production time to a third or even a half of that required by previous methods.

Now, it's entirely possible that this unit costs a little more to install. BUT—a close examination of the cost records indicate savings after savings after savings. Just simple arithmetic proves the economy of a "little more costly" Holcroft furnace. Write today for details. Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Michigan.

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CLEVELAND 15 — Wallace F. Schatt, 1900 Euclid Ave.
HOUSTON 1 — R. F. McArdle, 5724 Navigation Blvd.
CANADA — Walker Metal Products, Ltd., Windsor, Ontario
EUROPE — S. O. F. I. M., Paris 8, France

machines are reviewed—good, reliable, quick disconnect couplings and leakproof rotating joints are two elements that are still necessary to further the program.

Aircraft Variable Delivery High Pressure Fuel Plunger Pump

by John Pelz
Bendix Products Division, Bendix Aviation Corp.

THE J. P. series high pressure fuel pump is of multi-plunger, variable stroke, positive displacement type, incorporating built-in overspeed and maximum pressure control mechanisms. Delivery and pressure can be accurately and automatically selected by a remote control device.

Below is a brief outline of sections of the paper:

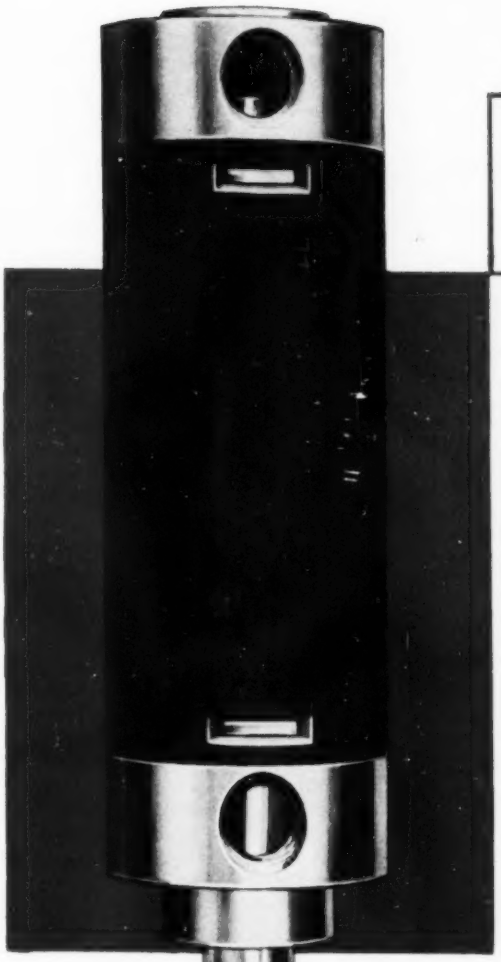
(1) History of pump prior to its manufacture in this country.
(2) Description of schematics of:
  (*a*) Fuel delivery section
  (*b*) Pump control section
  (*c*) Overspeed control section
(3) Pump characteristics and curves.
(4) Brief description of pump analysis and advantages of this design — development of water proofing rotor.
(5) Applications:
  Motor
  Positive displacement pump
  Used as flow meter satisfactory to 0.25 per cent accuracy
  Variable stroke

Friction and Wear Phenomena in Oil Hydraulic Equipment

by W. P. Green
Manager, Heat Power Research Dept., Armour Research Foundation

AMONG the many problems faced by the hydraulic engineer and machine designer, the problems of friction and wear are the most important and frequently the most difficult. Positive displacement pumps, control valves, actuating cylinders, bearings, and rotating seals of all kinds, have metal parts in rubbing contact with each other, frequently under considerable loads and speeds. Success or failure of a design can depend on the degree to which friction and wear problems were approached adequately.

Considerable research has been carried out on friction and wear phe-



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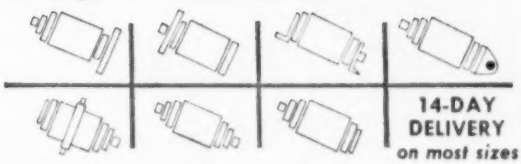
make

O-M CYLINDERS

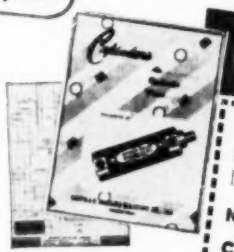
adaptable to any installation! . .



Because the end plugs are tapped for universal mounting, any one type or combination of mounting brackets can be used to install an O-M Cylinder . . . *without disassembling or changing the cylinder.* Interlocking mechanism eliminates projecting end caps and tie rods, assuring better alignment and friction-free performance. Thus, O-M Cylinders fit where others won't . . . require ⅓ less space than conventional type cylinders of the same bore . . . are easily removed, inspected, repaired.

Available in a full range of sizes (1½" to 8" bores) with standard, 2 to 1 or oversize rods. All machined steel with bearing bronze, no castings. Completely interchangeable parts.

Write today for FREE catalog and complete set of ½ and ¼-scale templates showing all cylinders and mounting brackets.



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nomena in the last two decades, little known among engineers, but from which useful conclusions can be drawn for design applications. What is the mechanism of dry friction? Is it shearing of surface asperities, seizure, cold welding, or just ploughing action due to roughnesses? Does transfer of metal take place, for instance, between plunger and bore of a piston pump? How thick is a monomolecular layer of a lubricant, and how much lubrication can it accomplish? These and many other fundamental and applied problems have been investigated. The authors have summarized some of the more important old and recent findings in this paper.

Ball Piston Pumps and Motors

by W. T. Rauch and H. Stern
General Electric Co.

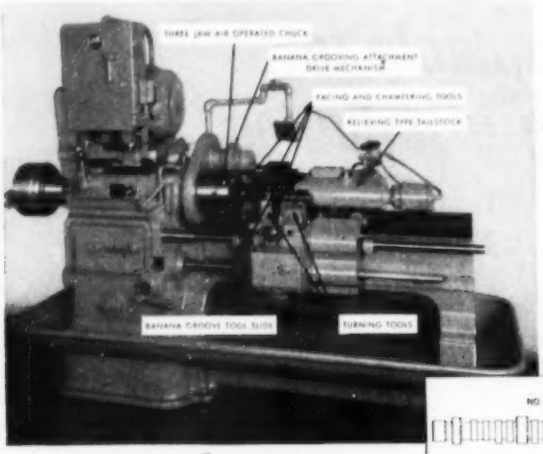
A COMPACT high pressure hydraulic pump, using steel balls as pistons and running at high speed, has been developed. Numerous previous attempts have failed to realize the possibilities of high performance which this simple design offers. Fixed displacement units of as few as 15 parts, seven of which are ball pistons, have been built for 3000 psi continuous operation. Short peak loads of 5000 psi are permissible.

Units of five hp or less have been operated at speeds in excess of 20,000 rpm. Direct drive from ram air turbines, electric motors, or engine pads is possible. A 24 gpm 30 hp pump can be run at 8300 rpm, while larger units up to 500 hp are operated at proportionally lower speeds. The ball pump features low inertia parts, and consequently has excellent controllability. Pumps, as well as motors of a similar design, are ideally suited as servo components. Variable and fixed displacement units in combination lend themselves to differential transmission applications. Such a transmission is being used to drive an alternator at a constant speed from a variable speed aircraft engine.

In addition to the common hydraulic fluids, ball pumps have been operated on low lubricity fluids such as silicone and kerosene. Modern technological progress demands even more horsepower at high operating temperatures. The ball pump shows promises of solving problems of prime importance inherent in high speed, high temperature and lightweight design for aircraft.

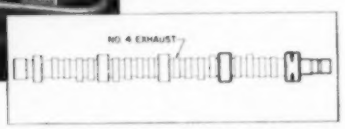
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

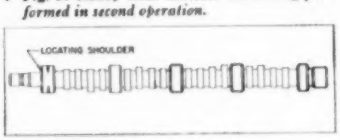


◀ *Fig. 1. Model "LR" Lo-swing Lathe tooled for first operation.*

Fig. 2. Heavy lines indicate machining performed in first ▼ *operation.*



▼ *Fig. 3. Heavy lines indicate machining performed in second operation.*



MODEL "LR" Lo-swing LATHE AUTOMATICALLY TURNS, FACES AND CUTS BANANA GROOVE IN CAMSHAFTS

PROBLEM: To turn, chamfer and face all bearing and gear fit diameters and cut banana oil groove in definite relation to No. 4, exhaust cam on automotive camshafts.

SOLUTION: Two Model "LR" Automatic Lo-swing Lathes were tooled to handle this job in two operations as follows:

First Operation. Camshafts are delivered to the machine with both ends faced, centered, and straightened to required tolerance. The first operation lathe is fitted with a large bore headstock spindle and a special 3-jaw, air-operated chuck (Fig. 1). This spindle carries a center, located deep in from the chuck face, to support and locate the camshaft. The opposite end is supported on a revolving tailstock center. The relieving-type tailstock swings clear to permit straight-line work loading.

Before loading, the operator attaches a clamp dog, which fits into a groove in the chuck face, to No. 4 exhaust cam. This positions the camshaft in radial relationship to the timing of the banana grooving attachment, which is driven from the headstock spindle. High spindle speeds and coarse feeds with insert type carbide tools are possible with this drive which reduces unsupported length and insures extreme rigidity.

Second Operation. Remaining bearings are machined in the same general manner as on the first operation, although the banana grooving attachment is omitted.

Camshafts being machined are made of a special grade of cast iron. Hourly production at 100% efficiency is 90 camshafts. Bring *your* turning problems to Seneca Falls.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

Hydraulics Applied to the Automobile Suspension

by Robert R. Peterson
Chrysler Corp.

THIS paper concerns a type of direct-acting shock absorber developed by the Suspension Department of Chrysler Corporation and used currently on all Chrysler Corp. passenger cars. The Oriflow unit differs considerably from conventional units in construction and in performance. Because it is intended to fulfill certain ride requirements ordinarily left to other suspension components, the subject of passenger car ride is considered briefly, with particular reference to the capabilities and limitations of shock absorbers in general. The construction and operation of conventional direct-acting shock absorbers is then described in some detail and their performance characteristics analyzed and evaluated. Finally the development of the Oriflow unit is outlined and its construction, operation and performance are compared with those of conventional types.

To Avoid Fluid Line Troubles

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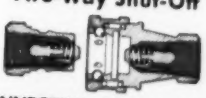

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Wonder chemical

CHANGES METAL SURFACES, MAKES PAINTED PRODUCTS *look better longer*

NOT ALL "wonder chemicals" are new! Here's one that for more than a score of years has been doing a job that manufacturers at first said couldn't be done.

In as little as sixty seconds, Bonderite changes the surface of metal parts to a *nonmetallic* layer of unusual properties. Bonderite is used on automobile bodies, refrigerator cabinets, transformers, hardware, and metal furniture, to name a few items out of thousands.

This nonmetallic coating does several amazing things. Because it has an affinity for organic coatings and is integral with the metal, it takes and holds paint securely, preventing chipping and peeling. It acts to keep moisture from reaching the metal, thus controlling rust and corrosion. And should the paint film be damaged by accidental scratch or dent, Bonderite prevents the spread of finish failure.

All of these benefits combine to mean lasting fine appearance for those thousands of products whose manufacturers use Bonderite before painting.

Unlike many "wonder chemicals," Bonderite requires no special handling. It produces excellent results in large and small installations, in spray and immersion applications, and on steel, aluminum, zinc, or cadmium and their alloys.

The cost of Bonderite is small—a fraction of a cent per square foot of area treated—and the benefits are great.

Your inquiry will get prompt, expert, helpful attention.

*Bonderite, Bonderlube, Parco, Parco Lubrite — Reg. U.S. Pat. Off.

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corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces

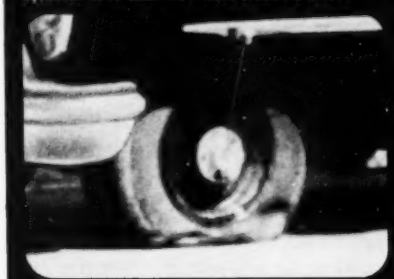
You're Safer with Saginaw ...even with a BLOWOUT

HERE COMES A CAR DOING 50 MILES AN HOUR

EQUIPPED WITH SAGINAW POWER STEERING AND

TWO DYNAMITE CAPS IN THE LEFT FRONT TIRE!

BANG! THERE'S A MIGHTY DANGEROUS BLOWOUT!

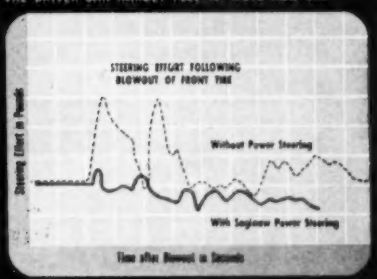


BUT NO VIOLENT PULL ON THE STEERING WHEEL

THE DRIVER CAN HARDLY FEEL IT. NOTE HOW CAR

PARALLELS THE RAIL. DOESN'T LURCH A BIT!

CHART SHOWS HOW EASILY YOU KEEP CONTROL AS


STEERING EFFORT FOLLOWING BLOWOUT OF FRONT TIRE
Steering Effort in Pounds
Without Power Steering
With Saginaw Power Steering
Time after Blowout in Seconds

SAGINAW POWER STEERING RESISTS THE TWISTS!

This sequence of unretouched photographs was taken from a motion picture of test runs at the General Motors Proving Ground. They clearly prove that if you have a blowout like this—hit a chuckhole or soft shoulder—*you're safer by far with Saginaw Power Steering on your car.* **It's now available on all General Motors cars and three other well-known makes. Be sure to ask for a demonstration. *Once you try it, you'll never want to be without it!***

Saginaw
POWER STEERING

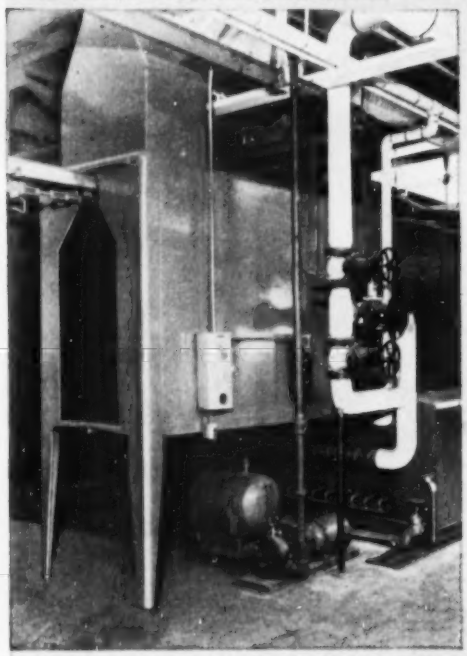
SAGINAW STEERING GEAR DIVISION GENERAL MOTORS CORPORATION, SAGINAW, MICHIGAN

COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

Mahon Low Temperature Finish Drying Oven at American-Standard. View shows Heating, Recirculating and Exhaust Equipment as well as the Control Cabinet Housing Temperature Controls, Recording Instruments and Safety Devices.

View at One of Two Complete Mahon Finishing Systems Installed in the Buffalo Stamping Plant of American-Standard. Metal Cleaning and Rust Proofing Machine and Dry-Off Oven are in the Foreground.



Exit End of Mahon Metal Cleaning and Rust Proofing Machine at American-Standard. Processing Solutions are Heated by Steam. Temperature Control is Automatic.

HEATER PANELS at AMERICAN STANDARD are also FINISHED in MAHON EQUIPMENT!

Major elements of a second Complete Mahon Finishing System installed in the Buffalo Stamping Plant of American-Standard are illustrated here. This second system, like the other, is ultramodern in every respect. Parts are carried on a single conveyor which passes through a five-stage Metal Cleaning and Rust Proofing Machine, a Dry-Off Oven, a Cooling Tunnel, two Conventional Type Hydro-Filter Spray Booths which are staggered right and left hand, for spraying opposite sides, and finally through a Low Temperature Finish Drying Oven. This is another typical Mahon Finishing System designed to do a specific job efficiently and economically. If you have a finishing problem, or are contemplating new finishing equipment, you will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . better qualified to do the all-important planning, coordinating and engineering of equipment—which is the key to fine finishes at minimum cost. And, you will also find that Mahon equipment is built better for more economical operation over a longer period of time. Mahon's background history in this highly specialized field covers thousands of Complete Finishing Systems including Dip, Flow Coating and Spray Equipment for every conceivable product painted on a production basis. See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-654.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling, and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, and Drying and Baking Ovens, Cooling Tunnels. Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other units of Special Production Equipment.

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A G-E PACKAGED JOB and proven dependability of G-E motor control centers sold the planning team of George Sall Metals Company and Kuljian Corporation engineers on specifying G.E.

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G-E Motor Control Centers Specified For New "Automatic" Processing Plant

The Kuljian Corporation, Philadelphia, engineers and constructors, specified G-E motor control centers to help in the "automatic" processing of scrap metal at the non-ferrous smelting plant of The George Sall Metals Company in Philadelphia. Like other industries—chemical, paper, automotive—where automatic control is important, George Sall Metals wanted the most modern up-to-date equipment available. They had the plant planned for the ultimate in economical and automatic processing.

Whether you are building a new plant or modernizing existing facilities, specify G-E motor control centers for centralized control of a-c motors up to 200 horsepower.

FOR MORE INFORMATION, contact your nearby General Electric Apparatus Sales Office or authorized distributor, or write Section 781-5 for Bulletin GEA-4979A today. General Electric Company, Schenectady 5, New York.

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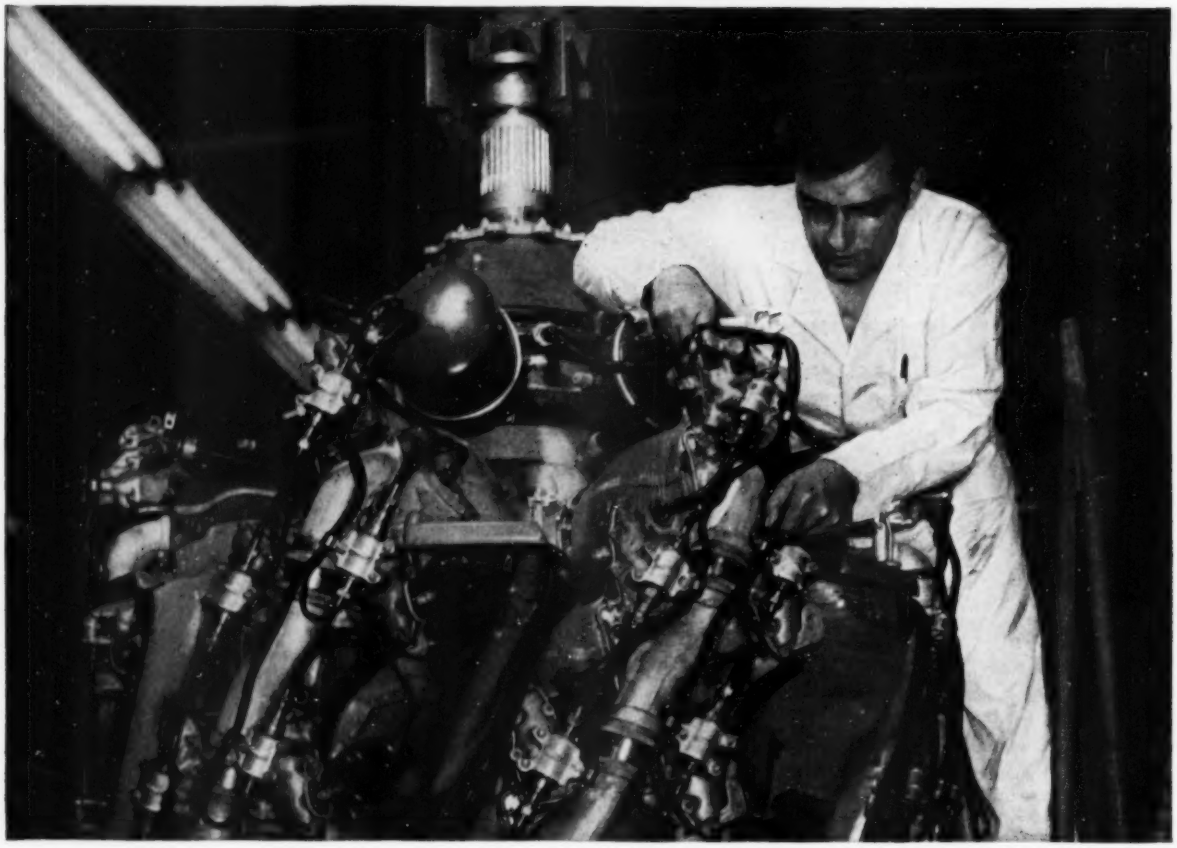

B. F. Goodrich Chemical Company supplies only the Geon latex. Scintilla Magneto Division, Bendix Aviation Corp., Sidney, New York, manufactures and supplies the harness to United Air Lines.

FOR ENGINES—MORE SAFETY, LOWER MAINTENANCE

with Geon coated harness

This is a Pratt and Whitney Wasp Major 28 cylinder engine that powers United Air Lines huge Boeing Stratocruisers—and does a better job because of a new type low tension ignition harness. The harness is subjected to physical strains, along with chemical reactions, which formerly caused the covering to chafe through the insulation to the conductor. Now all 7 harnesses on each engine are protected by an outer coating of Geon vinyl plastic latex, which improves engine safety, lowers maintenance costs.

Besides giving improved abrasion resistance, the Geon vinyl latex cover provides better moisture and water protection and resists the effects of mineral spirit solvents while the engine is being flushed clean. Like all Geon vinyl plastic materials the coating also assures resistance to oils, greases, alkalies, acids, chemicals and will not support combustion.

What Geon does for this wire coating may start you thinking about how Geon materials can help you improve or develop more saleable products. We'll be glad to give you helpful, technical advice. For information, please write Dept. HG-11, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

GEON RESINS • GOOD-RITE PLASTICIZERS . . . the ideal team to make products easier, better and more saleable

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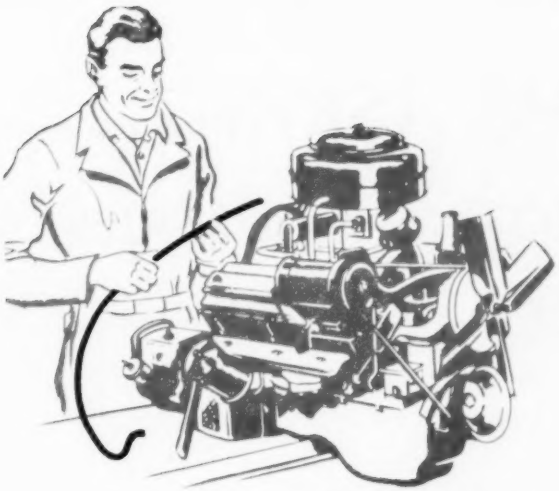

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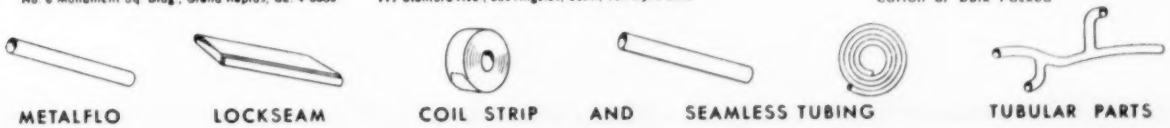

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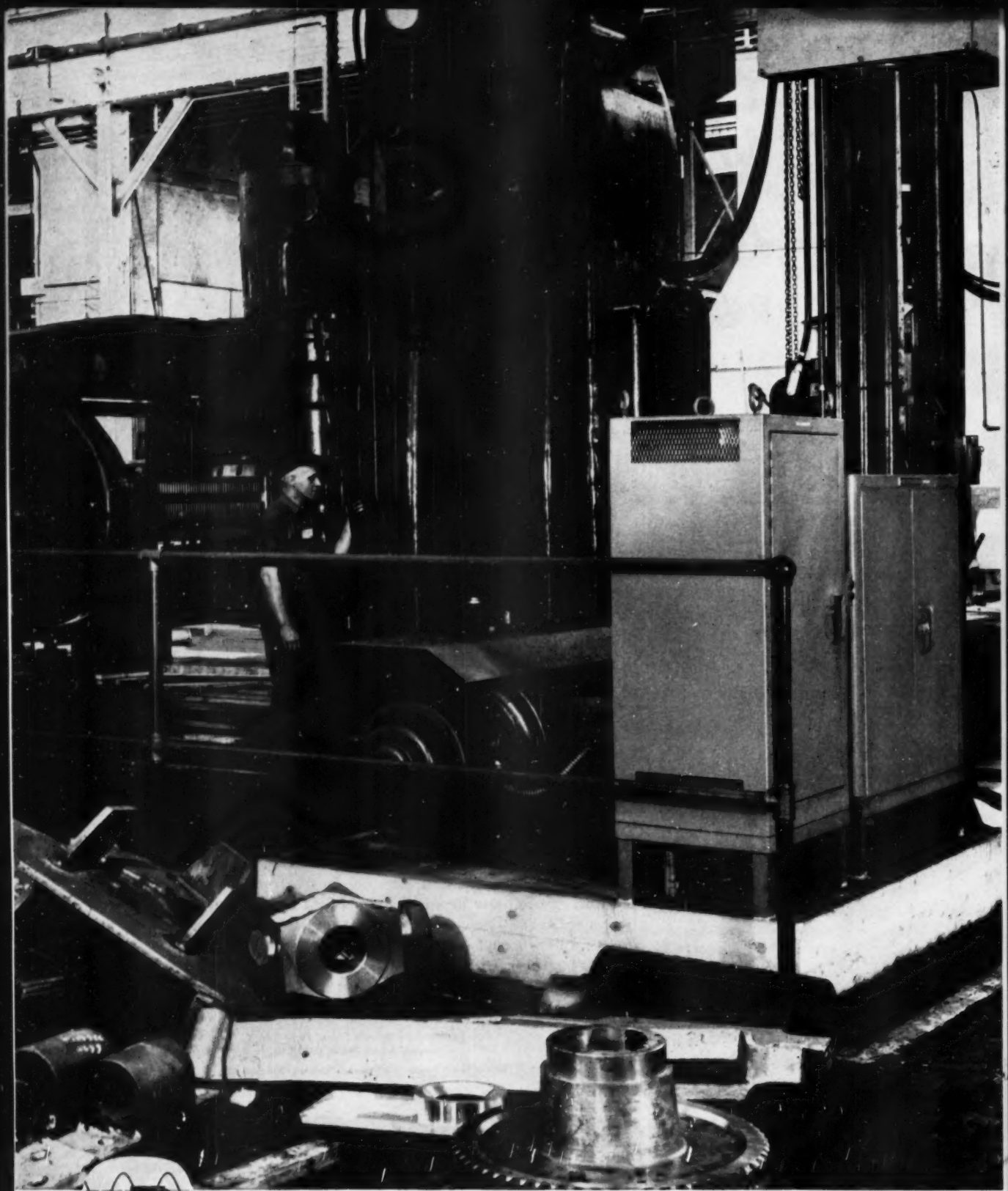

AUTOMATION STARTS WITH WESTINGHOUSE MOTORS AND CONTROLS

How to remote control quality with *Life-Line** AV Drive

With seven-foot stroke, this Morton draw-cut planer goes after a wide variety of large-scale machining operations. Whether milling, drilling or boring with this machine, precise, high-quality work is more easily accomplished with the flexibility of machining speeds made possible by Westinghouse AV Drive.

AV Drive produces a wide range of speeds within a 16:1 ratio. Operation of the planer is never limited by static gear ratios. The optimum machining rate can always be selected for precision work, top efficiency, and long tool life.

Heart of Life-Line AV Drive is the power package containing a motor-generator set and all necessary controls. The m-g set receives a-c plant current and delivers d-c power to a d-c drive motor. An operator remote-control station completes the drive system.

After each new job is set up on the cutter-planer, the operator starts the machining head in operation from the drive-control station, and selects an operating speed. During progress of the work, fractional adjustments in machining speed are easily made. In addition, intelligence equipment can be added to measure the progress of the work and automatically govern speed acceleration, deceleration, or dynamic braking of the drive.

Result... different types of steel alloys, cast steel, cast iron, or varied shapes and thicknesses of material are machined more precisely. Tool life is prolonged and work goes faster, more efficiently, because the cutter-planer is always operating at optimum speed.

New AV Drive Booklet is available now, giving full details on how this power package is applied in different industries. Call your local Westinghouse representative for your free copy of B-5808, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21755

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YOU CAN BE **SURE**...IF IT'S

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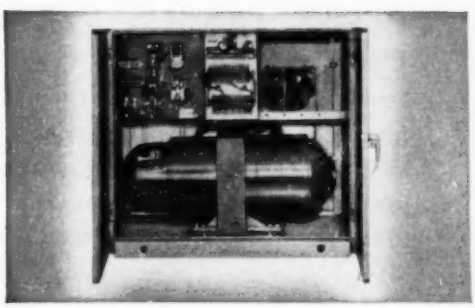
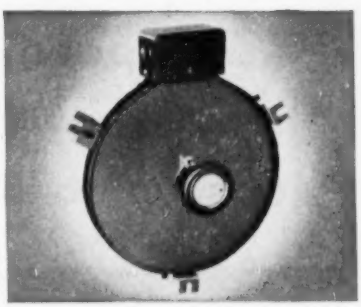


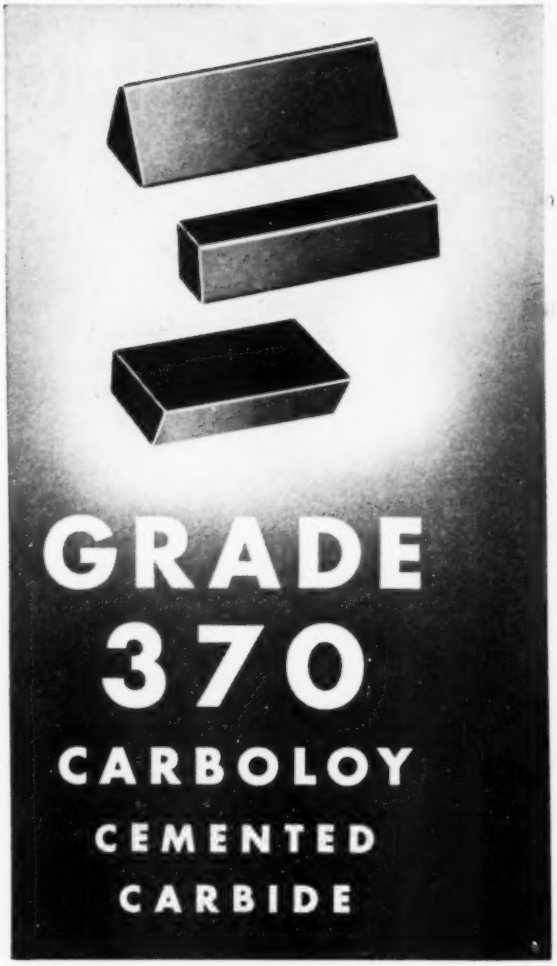
Power Package is the heart of Westinghouse AV Drive. It contains a motor-generator set and necessary controls. These components are factory engineered, tested and assembled, in a compact enclosure. Control components can be added for automatic sequencing, speed acceleration, deceleration or dynamic braking.

"Start-Stop" Speed Control allows remote control of electronically excited AV Drives. This operator station includes push-button control of the d-c drive motor and a potentiometer for precise speed-control.



Rheostat Speed Control is installed for remote control of selenium-excited AV Drives. One handwheel governs the motor over a complete range of speeds within a ratio of 16:1. Standard push-button controls are used to start and stop the drive motor.

A NEW CARBOLOY® CREATED-METAL



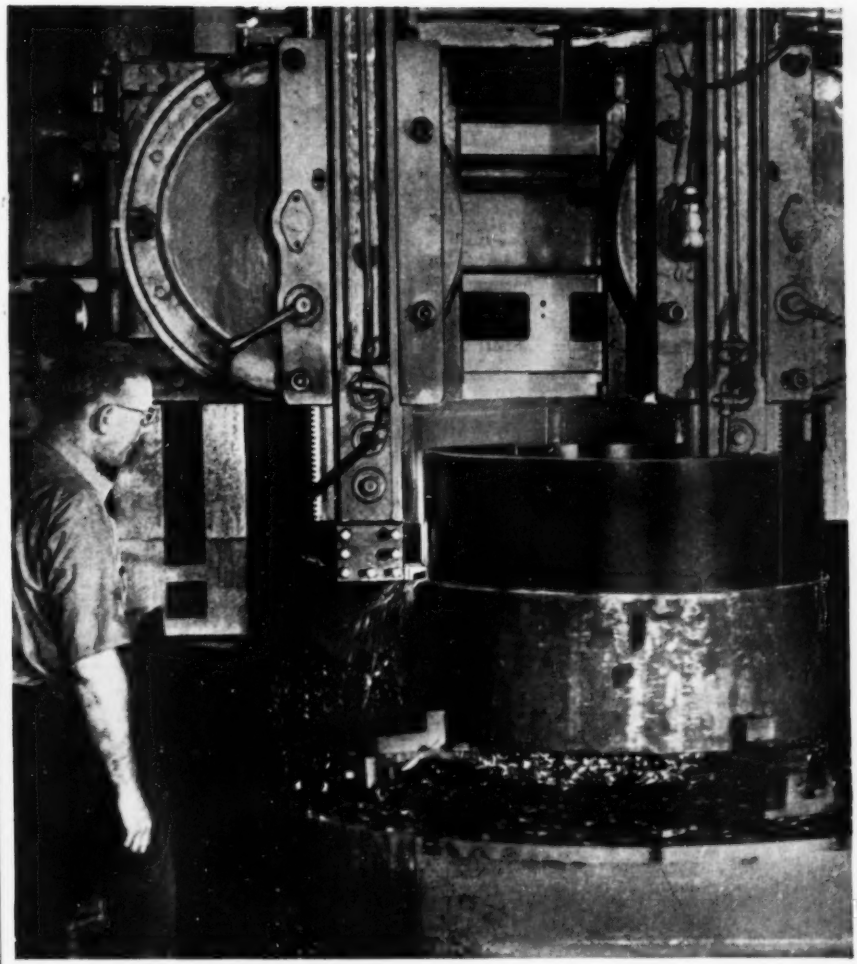
A heavy-duty carbide capable of cutting more cubic inches of steel per minute, with longer tool life, than existing carbides

. . . speeding your heavy-duty steel-cutting jobs up to 30 percent!

GRADE 370
The first of a new family
—Series 300—
of steel-cutting carbides

It's Grade 370 Carboloy Cemented Carbide – the first of an entirely new series specially developed for taking heavy cuts in steel at higher speeds. Unique grain structure lets it cut at around 1800° F without deforming – *higher than ever before practical* with any carbide. Tests and on-the-job applications indicate that Grade 370 can increase performance on many higher speed steel-cutting jobs by up to 30%. Now available in selected standard sizes and shapes.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company



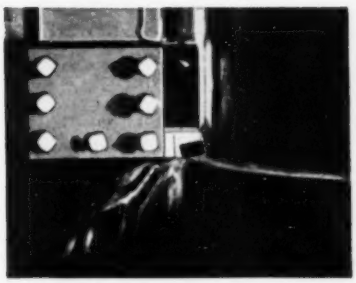
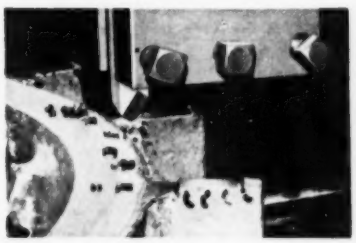


Photo at left and close-up, above, show Grade 370 taking a cut ½" deep, in large generator retaining ring of cast-alloy steel. The ring is machined at 110 FPM with .048" feed – causing tremendous heat to build up at the cutting edge. Grade 370 holds its shape and cutting edge under these tough conditions. Tool life increased 50%.



Above, Grade 370 machining generator stator frame. On this job a ½"-deep interrupted cut is made at a speed of 80 FPM with a .024" feed. Grade 370 continues to cut for longer periods under the constant jarring and high temperatures. Tool life increased 50%.

Grade 370 is the first of a new cemented carbide series tailor-made for today's *and tomorrow's* most severe metal-cutting conditions. The result of a quarter century of research- and development-pioneering in created-metals by the Carboloy Department.

MORE PERFORMANCE FOR YOUR DOLLAR

Its cutting superiority has been proved both in Carboloy laboratories and on tough on-the-job customer applications. On rolls, gun barrels, locomotive wheels and other heavy-duty operations, tools tipped with Grade 370 take heavier cuts at higher speeds and withstand higher temperatures than ever before practical – and this is done with even longer tool life than existing carbides. Tools cut more cubic inches of steel per minute . . . production goes up as much as 30%.

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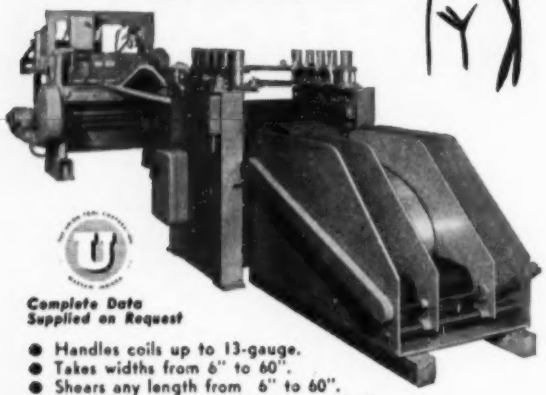

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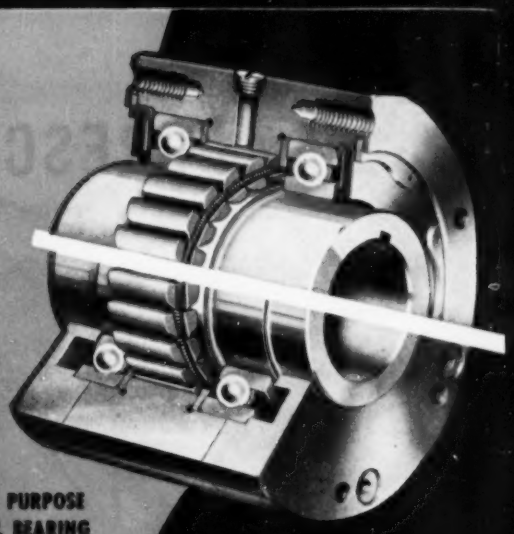

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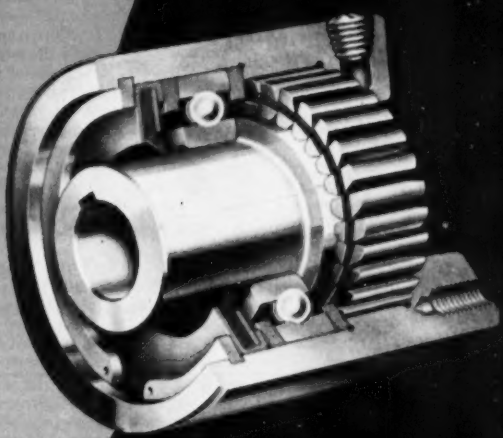

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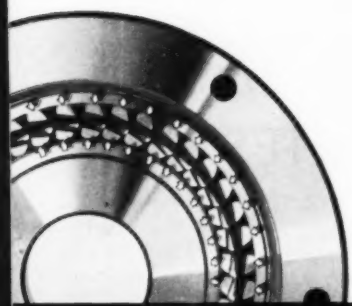

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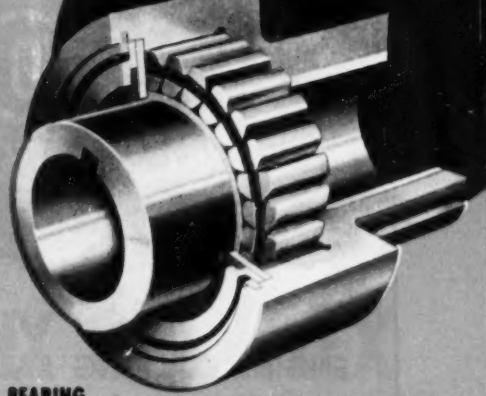

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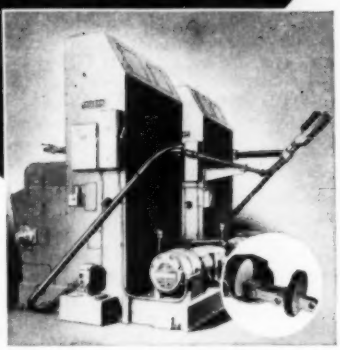

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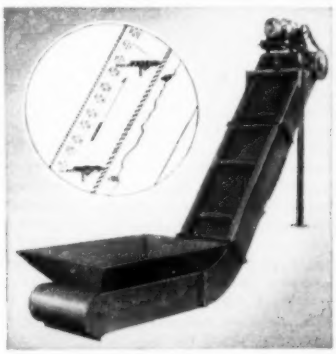

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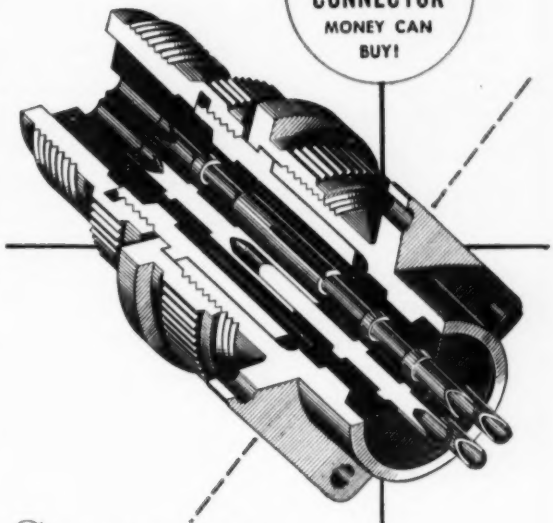

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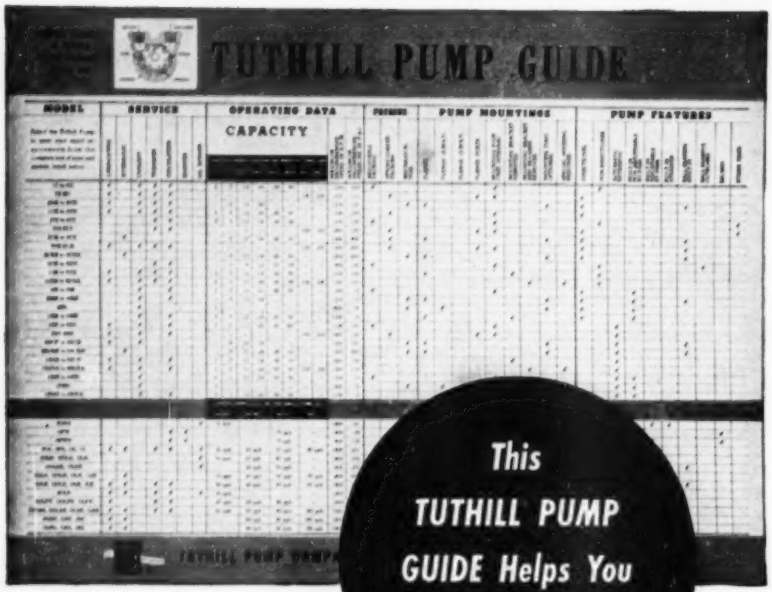

This TUTHILL PUMP GUIDE Helps You Find the Answer

To save you time and trouble in selecting the pump best-suited to your application, Tuthill engineers have developed this revolutionary new Pump Guide. Here, in one easy-to-use chart, is a volume-full of information on the complete line of Tuthill Pumps.

At a glance, it shows you the services for which each model is built, together with performance characteristics, types of packing, mounting styles and distinctive features that enable you to fit the pump to your need, rather than the need to the pump.

Copies of this helpful guide are now available on request. Write for yours today—there's no obligation.

Tuthill Positive Displacement Pumps serve Industry in Lubrication, Hydraulic, Coolant, Oil Burning, Circulating and Transfer Service.

TUTHILL PUMPS FOR THE PURPOSE

TUTHILL PUMP COMPANY
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PUMP GUIDE

for Maintenance Men...

NEW CATALOG ON

TUTHILL MODEL CK HIGH-PRESSURE PUMPS

NOW READY TO HELP YOU

This concise book gives you types and sizes of Tuthill High Pressure Pumps to meet any requirement for hydraulic service where the operating pressure does not exceed 400 p.s.i. Included is data on the following types in capacities from 5 to 200 g.p.m.

MODEL CK—Compact, self-priming, uni-directional. Spring-loaded packing. Direct drive or belted units.

MODEL CKB—Same as Model CK, with dependable Tuthill mechanical shaft seal.

MODEL RCK—Includes Tuthill's exclusive automatic reversing feature. Available also with mechanical seal as Model RCKB.

Write for Tuthill Catalog No. 103 today.

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Dependable Rotary Pumps since 1927
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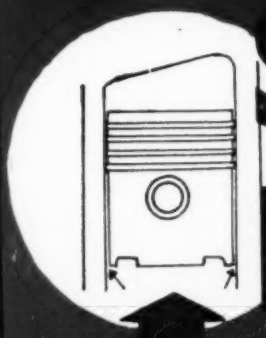


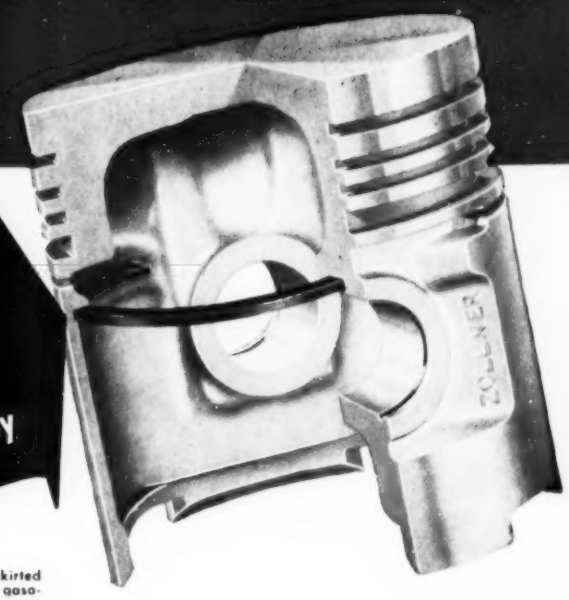
SPECTACULAR PERFORMANCE

UNIFORM EFFECTIVE SKIRT CLEARANCE AT ALL TEMPERATURES

ZOLLNER CLEAR-O-MATIC* PISTONS

*T. M. Reg. Pat. App. For

STEEL TENSION MEMBER
Anchored only at pin bosses and cast in positive contact with I. D. of piston skirt
Controls Clearance Automatically



Design adaptable to full skirted or slipper-type pistons for gasoline engines for every purpose.

Heralded by engine builders everywhere as sensational, the Zollner developed CLEAR-O-MATIC Piston *reduces required clearance to less than .001 with positive uniformity of skirt bearing under all temperatures.* The steel tension member incorporates in the aluminum piston the same effective expansion as the ferrous cylinder itself. Spectacular in performance, the CLEAR-O-MATIC Piston results in a *quiet engine with no cold slap, reduced friction without loss of durability or heat conductivity.* We suggest an immediate test of these advantages in your engine.

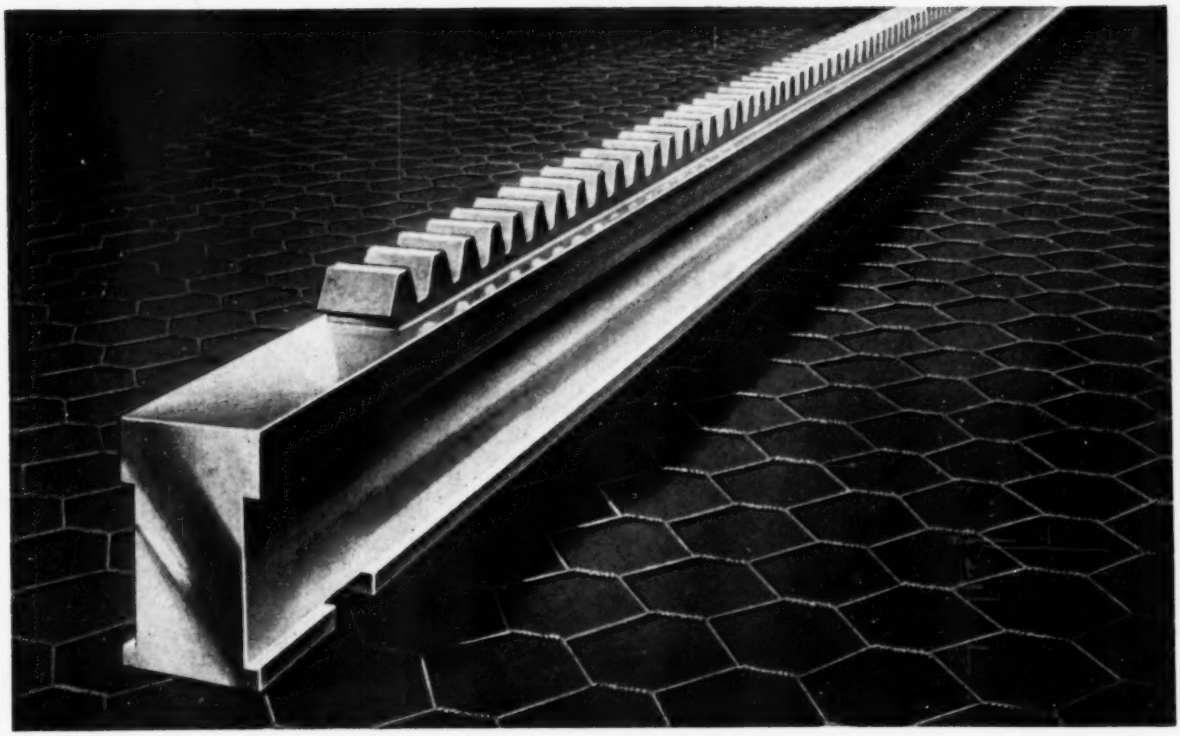
1. Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
2. Effective expansion identical with ferrous cylinder.
3. Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
4. Normal diametric clearance usually less than .001 with uniform skirt bearing.
5. Durability and conductivity comparable to heavy duty design.

ZOLLNER

The Original Equipment **PISTONS**

- ADVANCED ENGINEERING
- PRECISION PRODUCTION in Cooperation with Engine Builders

ZOLLNER MACHINE WORKS • FORT WAYNE, IND.



7-foot Graph-Mo® steel rack hardened without distortion

THIS long, slim gear rack, part of a new Wean Equipment Company hexagon netting machine, started out as a problem child.

With the first steels tried, case hardening caused extreme distortion. And the few racks that did harden straight enough to be useable did not wear well.

As soon as the manufacturer turned to Graph-Mo®, one of four graphitic steels developed by the Timken Company, the problem vanished. Because Graph-Mo responds uniformly to heat treatment, the racks hardened without distortion. Heat-treating scrap was completely eliminated.

In addition, the Graph-Mo racks gave exceptional wear. First, the free graphite in Graph-Mo's structure acts as a built-in lubricant—reduces friction between the rack and the gears it engages. Second, diamond-hard carbides in Graph-Mo give it great resistance to abrasion and wear.

On top of all this, there was a 30% saving in machining time—Graph-Mo being easier to machine than ordinary tool steels.

For helpful information on the use of Graph-Mo and other graphitic tool steels for machine parts, dies, punches and gages, write for the 10th edition of "Timken Graphitic Steel Data Book". The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING